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NEW YORK
ZOOLOGICAL
SOCIETY

ANNUAL REPORT 1988-1989



AFRICAN ELEPHANT ALERT



TIBETAN
WILDLIFE



PROBOSCIS
MONKEYS:
SARAWAK,
MALAYSIA



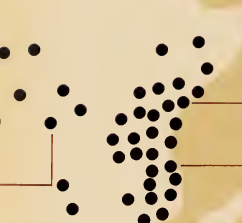
ELEPHANT
ALERT



BIRDS OF
PARADISE:
PAPUA
NEW GUINEA



BLACK RHINO
RESCUE





The New York Zoological Society is a non-profit organization chartered by the State of New York in 1895 to establish and maintain a zoological park, to encourage the study of zoology, to advance wildlife protection, and to furnish instruction and recreation to the people.

The City of New York, through its Department of Cultural Affairs, provides annual operating support for the Bronx Zoo and the New York Aquarium, both of which occupy City-owned buildings on City-owned property. The City's Department of Parks and Recreation provides funding for the Central Park Zoo.

The Society also receives funds annually from the Natural Heritage Trust, a program of the New York State Office of Parks and Recreation.

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(at June 30, 1989)

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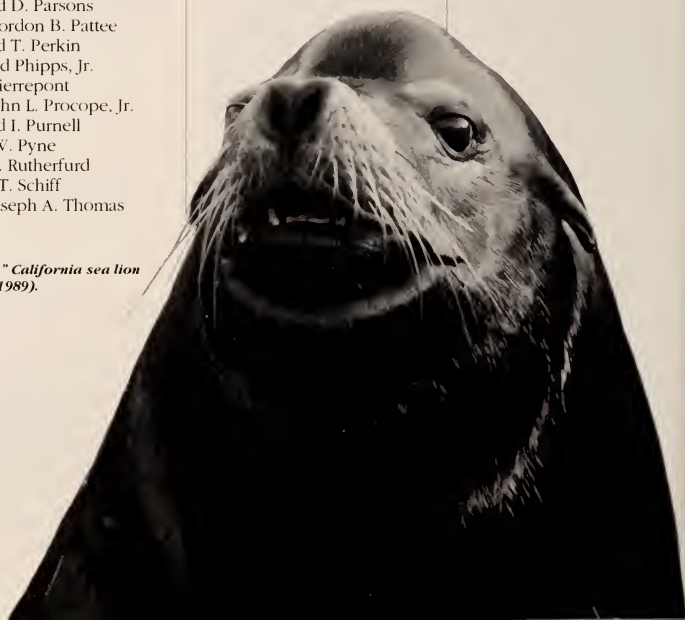
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"Moose," California sea lion
(1968? 1989).



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Baringo giraffe.



he New York Zoological Society's motto for the past year, and for years into the foreseeable future, might well be the old Russian saying: "When the ice is thin, you must run a lot faster." As the world's ecological condition deteriorates, the need for action accelerates.

Increasingly, the Society is called upon, here and abroad, to deal with problems of species survival, environmental degradation, and human need. The field conservation efforts of Wildlife Conservation International now encompass 113 projects worldwide, compared to 82 last year, and WCI's budget has gone from \$1.9 million in 1987 to \$2.6 million in 1988 to \$3.2 million in 1989. Similarly, research in nutrition, genetics, and animal management has proliferated, bolstered by a new in-house program to coordinate studies by NYZS staff and visiting scientists. And the Society's educational message is reaching not only hundreds of thousands of students in school systems around New York, but thousands more nationally and internationally through such programs as the Bronx Zoo's innovative seminars for teaching teachers.

We are also running faster to restore, modernize, and improve our great public facilities in New York. It took Herculean work by the Society's staff to open the new Central Park Zoo in August, to bring back the Bronx Zoo's magnificent old Elephant House as the Keith W. Johnson Zoo Center and the Wildfowl Pond as the John Pierpont Wildfowl Marsh, and to complete the innovative and educational exhibitry of the New York Aquarium's Discovery Cove. And much more is on the way.

There is growing recognition that additional support is needed for these essential programs. When the City proposed cuts in appropriations for fiscal 1990, hundreds of people wrote to

protest, and the funds were restored, not only for 1990 but also for 1989. Bronx Zoo and New York Aquarium operating support from the City, through the Department of Cultural Affairs, totaled \$8,772,177 in 1989. Central Park Zoo support from the Department of Parks and Recreation came to \$2,470,447. New York State, through the Natural Heritage Trust, provided \$2,126,000 to the Zoo and Aquarium in 1989, and Federal support totaled \$387,908, including grants from the U.S. Agency for International Development, the Institute of Museum Services, and the U.S. Department of Education National Diffusion Network.



Private contributions—dues, gifts, pledges, and bequests—totaled \$13,413,869 from foundations, corporations, and private individuals. In that total were funds for some particularly exciting initiatives. The John D. and Catherine T. MacArthur Foundation pledged \$1 million over three years to fund WCI projects in the world's highly vulnerable tropical rain forests. The Liz Claiborne-Art Or-

tenberg Foundation gave \$155,000 for various WCI projects in Africa, including funds to purchase a corridor of land for elephants at Lake Manyara in Tanzania. And the Bay Foundation will fund a new program enabling the Society's Animal Health Center to offer veterinary help in other countries.

For continuing support, we are particularly grateful to two major contributors. The Lila Acheson Wallace NYZS Fund disbursed \$1.4 million for endowment and several projects at the Bronx Zoo and the Central Park Zoo. And once again the Edward John Noble Foundation provided funds for the Wildlife Survival Center on St. Catharines Island, Georgia. Indispensable capital gifts were made by Eleanor Avery Hempstead for the Keith W. Johnson Zoo Center and by The Horace W. Goldsmith Foundation for Discovery Cove.

Another important gift for Discovery Cove came from the Women's Committee, which was more active than ever during Leslie Perkin's last year as president. The year culminated on May 31 at the Bronx Zoo with the highly successful "Safari!" party, which raised some \$345,000 for the planned Great Gorilla Forest exhibition. Mrs. William C. Beutel was inducted as new president as the year came to an end.

Corporate giving reached new heights at \$1,182,824, as Marshall Manley, chairman and CEO of AmBase Corporation, completed his final year presiding over the Business Committee. Mr. Manley was honored with the Society's Distinguished Leadership Award at the Committee's second Corporate Benefit at the Central Park Zoo, and Richard A. Voell, CEO of The Rockefeller Group was named new chairman of the committee.

As a means of recognizing and encouraging donors, both the corporate and the individual

campaigns have established giving categories. The Corporate Membership Plan, instituted in fiscal 1988, offers a progressive scale of benefits for contributing Members (\$2,500), Sponsors (\$5,000), Patrons (\$10,000), and Benefactors (\$20,000). The Animal Kingdom Club, which Trustee John Elliott, Jr. was so helpful in formulating, recognizes levels of individual giving from \$5,000 to more than \$1 million, from the Curators Circle to Best Friend. Another new fund-raising instrument for individuals is the Pooled Income Fund, which is already off to a successful start with several contributors.

We note with sorrow the passing of two long-time friends of the Society. David Hunter McAlpin served with distinction for 50 years, as trustee, advisor, honorary trustee, and, from 1953 to 1967, as treasurer of the Society. Chauncey D. Stillman had been a trustee since 1960 and honorary trustee since 1982, with a particular interest in wildlife conservation.

Some distinguished additions have been made to the Society's governing boards. Mrs. Gordon B. Pattee, a very active contributor and former president of the Women's Committee, and Edith McBean, one of the Aquarium's most enthusiastic supporters, were elected trustees after several years as advisors. Named advisors were William Gruenerwald, who runs an extraordinary equid sanctuary in New Mexico; Anne Pattee, a staunch supporter of WCI's work in Africa and South America; Bradley Goldberg, who has backed Alan Rabinowitz's work in Thailand; and Mrs. William C. Beutel, new president of the Women's Committee.

Howard Phipps, Jr., President

Never in one year, not since the founding of the Society, have so many Zoo and Aquarium exhibits been unveiled. From August 1988 to July 1989, four major new facilities were opened.

On August 8, 1988, people began flooding into the newly lush and elegant Central Park Zoo—319,650 visited during the first 30 days. They came to see gentoo penguins and colobus monkeys, leaf-cutting ants, horned frogs, California sea lions, and the new Zoo itself. Despite the constraints of its “Landmark” 5.5-acre site, the Zoo was redesigned by the Society in a way that gives wild animals a fresh, bright stage in the heart of the City.

On June 7, 1989, a group of friends and Zoo diehards assembled in the rain to open the John Pierrepont Wildfowl Marsh and pay tribute to its distinguished namesake. The lovely green Marsh quickly became a favorite spot with Zoo aficionados, its expansive waters, its natural plantings of reeds, wildflowers, and grasses, and its contented mergansers, canvasbacks, and teal making it the most restful island of nature in the Zoo.

Then, on July 7, the extraordinarily intricate, high-tech Discovery Cove opened at the Aquarium with a stunning variety of unfamiliar creatures and specialized exhibits designed to help understand them. They included coral reef fishes and anemones, crashing waves and sandy beaches, and countless opportunities for children and adults alike to explore the world just out of sight beyond the breakers crashing on Coney Island’s beach.

Finally, on July 19 in the Bronx, the grand old 1908 Elephant House emerged from mud and construction fences, in a magnificent palimpsest, as the Keith W. Johnson Zoo Center. Thousands of zoogoers have already poured through its

great glass portals and past its soft, beautifully planted outdoor habitats. They discuss the majestic elephants and rhinos that stand alive before them and the powerful interpretive galleries that graphically detail the decline of these endangered giants—and many seem newly stimulated to reflect. Their observations reward us.



Biological Limitations

In June in Japan, meanwhile, WCI Director David Western quietly, painstakingly explained to officials, craftsmen, and merchandisers again and again the irrevocable implications of a culturally fueled trade in elephant ivory for trinkets and name seals. Western leads a desperate multi-organization conservation effort, as Africa’s elephants are being poached at the rate of one every 7.5 minutes.

How many elephants are enough? How much elephant habitat is needed? How many people are too many? The first two questions have been posed by conservationists and anti-conservationists alike, the third only by conservationists. The primary challenge to environmental education today is to teach biological limitations in a climate of ideas saying there are none.

If it is intended for elephants to survive, the answers to the questions above are straightforward: the number of elephants needed is at least that of a genetically and demographically viable population, distributed broadly enough to allow for such chance events as natural disasters and disease. There must be suitable climate and habitat, and enough space, food, and water on a sustainable basis. Those are the basics; then it gets complicated.

Where will these elephant zones be? If there are enough elephants in Gabon should Kenya do without? Is a simple biologically calculated number adequate replacement for the spirit-lifting spectacle of great herds? Which nations and communities will secure the honor and profits of caring for elephants, and paying for their protection, population control, and sustainable management?

The United States Endangered Species Act is intended to prevent the extinction of any more indigenous species of animals and plants. The nation is also committed to accelerated development. Where then will our wildlife live?

If it is intended for people to survive, the same questions of sustainability must be answered for us.

Institutional Evolution

Thousands of small terrestrial plants and animals are becoming extinct every year while pollution and

development are making biological deserts of coastal communities and wanton destruction endangers coral reefs. Most large terrestrial vertebrates will be sustained only as historical symbols in intensely managed zoos and in parks that have evolved into "megazoo" rather than remaining parts of functioning, relatively independent ecosystems.

Because zoos and aquariums focus on life and its diversity, they are, unavoidably and irrevocably, concerned with the future, with prosperity and perspective. This constitutes a fundamental difference between museums which deal with living things and those which do not. Almost all zoos, aquariums, and botanical gardens have significant conservation programs, while the majority of natural science museums without live collections do not. Inexorably, zoos and aquariums are evolving away from their origins in the museum community and becoming new kinds of institutions in the environmental science and conservation world.

Many scientists believe that only an international human tragedy is likely to initiate the environmental action needed to establish sustainability as a way of life, and then only after it is too late for much that we hold dear. Yet, there is a rising tide of realization and concern. We sense it in many of the 40 developing nations that host WCI projects, and we see and hear it at home. With increasing frequency, our Zoo- and Aquarium-goers are expressing not only understanding, but a wish to help. There is a chance that we can yet learn to live within our ecological means. But, inevitably, the modern zoo and aquarium must focus on tomorrow, as caretakers of life in an age of extinction.

William Conway, General Director



SANCTUARIES FOR WILDLIFE



n article in the *Zoological Society Bulletin* of October 1908 introduced the Bronx Zoo's new Elephant House. "In several important particulars the Elephant House is unlike all other buildings in the Park. It is high; it is entered at the center of each side, instead of at each end; it is built entirely of stone; it has a main roof of green tiles, and has a lofty dome..." Under the vaulted ceilings, the animals were displayed in traditional fashion. "Each of the eight immense cages, that are to contain elephants and rhinoceroses, has been designed to frame and display its living occupant as perfectly as a frame fits a picture." Today, only the first part of this description remains true.

Zoo Renaissance: Megamammals Return To The Keith W. Johnson Zoo Center

Eighty-one years after its original inauguration the Elephant House has been renovated and reopened as the Keith W. Johnson Zoo Center. It remains a magnificent palace for majestic animals, yet it is also a tribute to modern habitat exhibition and to cherished species that are rapidly disappearing.

As John Gwynne, Deputy Director for Design, explains, "The new Zoo Center plays two roles simultaneously. We have restored and enhanced the beaux-arts turn-of-the-century building with its spectacular feeling of a time long passed.

And in the same place, we have also created very different spaces for animals, and for the people, who find themselves immersed in the natural and wild habitat."

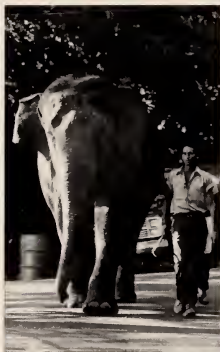
Zoo Center launches the long-term project of renewing Astor Court, originally modeled on the gardens of 17th- and 18th-century Europe. "Versailles, for instance," says Gwynne, "was very formal and rigid to reflect man's domination over the land. And zoos were just gardens with animals in barred cages so that visitors would feel safe. Today," he emphasizes, "zoos have changed from being menageries to being celebrations of life. As wild places shrink, the role of zoos expands, and the naturalness of the zoo experience becomes more important for both visitors and animals."

The animals now living at Zoo Center represent several highly endangered Asian species. The Asian elephant and Indian rhino populations are already reduced to small numbers and are subject to severe poaching for their ivory and horn. The Malayan tapir is also disappearing. Zoo Center is designed to re-create their Asian habitats, to show them in their natural wild setting, to profile them in the center of the Zoo, and to call attention to the Society's long-term commitment to saving these charismatic mega-vertebrates (see page 35).



BRONX ZOO MAMMALS

Elephants, rhinos, and tapers were the focus of attention as the July 19, 1988 opening of the *Keith W. Johnson Zoo Center* (see story on page 11) approached. With her keeper escort, the Indian elephant Tuss walked from Wild Asia to the restored Elephant House in May, where she was joined by newly arrived 18-month-old Samuel R. Assam, the Indian rhino, and Mama



Tuss ambles to her new home at Zoo Center with Primary Mammal Keeper Robert Terracuso.

and Snuffles, Malayan tapers, came later by truck.

Sumatran rhinos will eventually occupy the building's western end. The Society is participating in a cooperative international survival program for this extremely endangered species, which now numbers only 200 animals in the dwindling forests of Indonesia and Malaysia. Another such program involves the *kou-*

prey, a rare and little-known species of wild cattle. If successful captive breeding can be established for the species in its native Vietnam, offspring will be sent to the Bronx Zoo and other zoos for breeding.

The department is now active in 19 of the AAZPA's 32 *Species Survival Plans* (SSPs) for endangered mammals. Last year, seven SSP species reproduced at the Zoo: gorillas, red pandas, Asian small-clawed otters, Siberian tigers, snow leopards, Przewalski's horses, and barasingha deer. Other rare and endangered species that bred successfully were Rodriguez fruit bats, mustached tamarins, proboscis monkeys, pygmy marmosets, silvered leaf monkeys, red-handed tamarins, white-cheeked gibbons, babirusa, eld's deer, Formosan sika deer, Pere David's deer, pudu, and slender-horned gazelles.

Staff research in animal management, increasingly a priority, included Associate Curator Fred Koontz's spatial analysis of zoo mammal behavior; Collection Manager Penny Kalk's study of animal identification methods; Supervisor Pat Thomas's evaluation of the naked mole-rat's diet; Assistant Supervisor Claudia Wilson, Senior Keeper Kate Hecht, and Keeper Kim Tropea's growth-rate measurements of small-clawed otters; Senior Keeper Frank Indiviglio's examination of feeding techniques in Jungle-World's mixed-species exhibits; Senior Keeper Kathy MacLaughlin's



Inside the building are galleries with powerful educational displays that include backlit photos, videos, and ivory and rhino horn products. Ivory trinkets, a rhino horn cup, a Yemeni dagger, and rhino horn pills incorrectly said to have aphrodisiac qualities all demonstrate the wastefulness of the poaching. Outside, the formality once so familiar to park visitors has been retained in part to enhance the contrast between the people spaces and the animal spaces. "Making the



From Zoo Center's west side, Assam, a shy, 4,000-pound Indian rhino, can be seen close-up by visitors.

formal areas more formal," explains Gwynne, "and at the same time making the wild areas more wild, makes each one seem stronger and more special."

On one side of the building are formal gardens where there will soon be three-ton bronze casts of sculptures created in 1935 by Katharine Weems, whose model was Bessie, a famous rhino



The third, and smallest endangered Asian mammal at Zoo Center is the Malayan tapir.

recording of nursing bouts in babirusa; Senior Keeper Joan McCabe and Keeper Linde Ostro's charting of mouse deer neonatal development; and Keeper Florence Klecha's investigation of sea lion breeding success.

General Curator *James Doherty* was asked to become coordinator for the Malayan tapir SSP. He was also involved in SSP management planning for the small-clawed otter, gorilla, orangutan, and tiger and continued as a member of the IUCN Black-footed Ferret Captive Breeding Specialist Group. *Fred Koontz* joined the Bonobo SSP Propagation Group; helped write a conservation plan for the elephant shrew in Africa as a member of the IUCN Insectivores, Tree Shrews, and Elephant Specialist Group; and delivered a paper on giant pandas in Huirou, China. □

BRONX ZOO BIRDS

After 14 months of dredging, relandscaping, building visitor walkways, and

installing water pumping, aeration, and bubbling systems, the *John Pierrepoint Wildfowl Marsh*, with 16 species of ducks from around the world, opened on June 7 (see story on page 20).

The planned renovation of the Lila Acheson Wallace *World of Birds* began with the installation of new floors and major repairs of the roof and ceiling. Eventually, most of the exhibits, as well as the public areas and the interpretive program, will be redesigned to reflect exhibition techniques and educational concerns that have emerged since the building first opened in 1972.

Substantial gains were made in the long-term breeding program for *birds of paradise*, with six red birds of paradise hatched and five raised (see page 24). A king bird of paradise laid an egg and a lesser bird of para-



dise laid a fertile egg, both firsts. Breeding success continued for several endangered species, including the Malayan peacock pheasant, the Congo peacock, the Mauritius pink pigeon, and the wattled crane. Among the year's acquisitions were wattled bellbirds for the South American Rain Forest in the World of Birds and 20 guanay cormorants from Peru for the Harry DeJur Seabird Aviary.

A conspicuous void was left by the retirement of Superintendent *Gustave Waltz*, who came to the Bronx Zoo in 1951 and the Ornithology De-

partment in 1966. His knowledge of zookeeping, and particularly of breeding and raising chicks, helped establish the Zoo's role as a sanctuary for disappearing species. In one of his last projects for the Society, Gus traveled in 1989 to Malaysia, where he assisted in setting up a captive breeding program for Reinhardt's crested argus pheasants.

Chairman *Donald Bruning* traveled to Curitiba, Brazil, where he coordinated and chaired a Parrot Specialist Group meeting, and to Papua New Guinea, accompanied by Chairman of the Executive

Elephant aquatic behavior is given full expression at Zoo Center, especially on hot summer days.

that lived at the Zoo for nearly 40 years. In contrast is Woodland Walk, a representation of a soft, lush, green Asian forest. The new star of the Zoo, baby elephant Samuel R., can often be found in the pond, completely submerged and spraying water into the air with his trunk. Samuel R. is a gift from the Samuel and May Rudin Foundation and is named after Samuel Rudin, a long-time neighbor of and daily visitor to the Central Park Zoo. Easing his adjustment to the new environment is Tuss, a much older and motherly female.



On the other side of the building will be extremely endangered hairy or Sumatran rhinos. Expected in 1990, the rhinos will participate in a recently established international breeding program. For the present there is a very large male Indian rhino named Assam, as well as two Malay-an tapirs. The tapirs are Mama, mother of two other tapir residents of the Bronx Zoo, and her consort Snuffles. The rhino and tapirs are part of the Zoo's breeding programs and Species Survival Plans established by the American Association of Zoological Parks and Aquariums for these species.

While the animals certainly serve as major visitor attractions, modern exhibits also strive to convey the precarious status of habitats and ecosystems. The new Zoo Center was therefore designed as an Asian habitat exhibit, with more than 20,000 plants, including 40 species of trees. In addition, 42,000 grass plugs were planted, primarily by NYZS member volunteers (see page 56). The plugs are part of an experimental program in which it is hoped that several particularly tenacious types of grass, usually used where erosion threatens, will survive despite the natural pulling and trampling of the huge animals. So far, the grass is having some success.

The entire area is designed to pull the visitor into the exhibit. As Assistant Director of Exhibits and Graphics Mark Wourms explains, "there are grasses weeping over the edges of the exhibit, and fallen trees instead of barriers. All this helps to minimize the distance between the visitor and the animals." Many elements, says Wourms, are more than decorative. "On the south side of the exhibit, people look over a fallen beech tree to watch the elephants. The tree isn't real. It's a look-alike, designed and built by staff sculptors, with a



One of several endangered pheasant species to breed during the year was the blood pheasant from the Himalayas.

Committee Frank Larkin, to further develop the Research and Conservation Foundation of that country and to help create a network of reserves for birds of paradise and other wildlife. In Malaysia, Dr. Bruning and Larkin discussed new pheasant breeding programs with wildlife and zoo officials. He continued as chairman of the ICBP/SSC Parrot Specialist Group, the AAZPA Wildlife Conservation and Management Group, and the AAZPA delegation to CITES, and was recently named regional and international student book keeper for the Malayan peacock pheasant.

Curator Christine Sheppard was named chairman of the Species Survival Plan for cranes, and led a meeting in April to plan the long-term management of the four designated species—white-naped, hooded, red-crowned, and wattled cranes. Her incubation research on white-naped cranes continued, with the help of mammalogist Fred Koontz and electronics expert George Stetton, based on telemetric monitoring of an artificial egg. Dr. Sheppard was invited to join the Captive Breeding Specialist Group, which advises on captive breeding problems around the world. At the Zoo, she is particularly concerned with keeper training and the development of long-term acquisition plans. □



BRONX ZOO REPTILES AND AMPHIBIANS

The dwarf caiman, which lives in clear, fast-moving forest streams in tropical South America, became the seventh crocodilian species to reproduce at the Bronx Zoo, an unmatched breeding record. Five of the caimans hatched on September 2, 1988. Another of the seven species, the broad-nosed caiman from Argentina, bred for the second year.

Other notable *batchings and births* were recorded for the Dumeril's boa from Madagascar, the Travancore tortoise from India, New Guinea snapping turtles, tentacled snakes and rat-tailed snakes from Southeast Asia, Coahuilan box turtles from Mexico, and eastern hognose snakes from the American Northeast. Two Vietnamese box

turtles, from the Tonkin region and Hainan Island, hatched in July 1988 and are the first of this rare species to be bred in a zoo. *Acquired* were South American green vine snakes for the vines over the matamata's pond and striped Madagascan girdle-tailed lizards to join the related African sungazers and plated lizards in the Desert exhibit.

In *Species Survival Plans*, 18 Chinese alligators and 42 Madagascan radiated tortoises were hatched and added to studbooks kept, respectively, by Curator John Behler and Superintendent William Holmstrom. Several projects involved the department in *cooperative conservation work*. Five yearling *Orinoco crocodiles* arrived at the

Eastern hognose snakes bred at the Zoo are being released at Breezy Point to restore ecological balance.



steel beam in it. An elephant could easily move a real tree aside."

Samuel R., Tuss, Assam, Mama, and Snuffles, the wild Asian habitat, and the graphics are all part of the Society's sweeping efforts to enthrall and educate the public, and by doing so, to help save wildlife and wild places.

Discovery Cove Unlocks The Mysteries Of The Sea

For most of us, the oceans, where life was born, are as alien as the outer reaches of space. We know something about the larger mammals, such as dolphins and whales. We marvel at the variety of shapes and colors on a coral reef. And we are increasingly aware of how these wonders are being despoiled by our own carelessness. But we are just beginning to realize that our connection with the sea is a vital one and that it depends, in large part, on knowledge. One key to this knowledge is the George D. Ruggieri Discovery Cove, a new exhibition complex at the New York Aquarium.

Discovery Cove, named for the late Aquarium director and symbolized by his favorite animal, the octopus, is designed to make the unfamiliar realm of the oceans and other waterways accessible and familiar to thousands of visitors. A New England lobster boat, rather an unusual sight to many city dwellers, greets visitors at the entrance. Inside are simulations of coastal ecosystems found in the New York area, including the Sandy Shore, with a 45-foot-long wave; the Rocky Coast, with 400 gallons of water crashing against the cliffs; and the Salt Marsh.

Visitors also learn about the peculiar adaptations of marine animals to aquatic life and the relationship between people and the sea. Live



Every 45 seconds, 400 gallons of water crash against the cliffs of Discovery Cove's Rocky Coast.

animals to touch, dioramas, graphic and photographic portrayals, pushbutton demonstrations, and participatory games and devices all bring the visitor closer to the world of the largest mammals and the smallest invertebrates. In addition, videotapes play inside some of the tanks. "You can't always depend on an animal behaving in instructive ways," says Ellie Fries, assistant director of education at the Aquarium. On tape, angler fish wiggle their lures, starfish propel themselves on tiny feet, and seahorses give birth.

The underlying concept here, pioneered by the Aquarium Education Department in collaboration with Columbia Teachers College, is a new one of multi-generational learning. Particularly intriguing are the close-to-the-ground parts of

Zoo from Venezuela. In two years, they will be returned for release in the wild as part of WCI biologist John Thorbjarnarson's headstarting effort for this critically endangered species. In Putnam County's Bog Brook Unique Area, Curator Behler and herpetologists from the New York Department of Environmental Conservation continue to monitor the resident *Mublenberg's turtles*, using four-gram radio tags. Restoration programs in New York City are being conducted at Floyd Bennett Field, part of Gateway National Park, where rescued pet *eastern box turtles* have been released in newly created habitat, and at Breezy Point on Rockaway Inlet, also part of Gateway, where *eastern bog-nose snakes* raised at the Bronx Zoo have been released to restore the herpetofaunal balance.

In addition to administering the Nixon Griffis Fund for Zoological Research, which has awarded 58 grants totaling more than \$165,000 in five years, Curator John Behler served on the Crocodilian Advisory

Group and the Wildlife Conservation and Management Committee of the American Association of Zoological Parks and Aquariums and on the Crocodilian and the Freshwater Turtle and Tortoise specialist groups of the International Union for the Conservation of Nature and Natural Resources.

WILDLIFE SURVIVAL CENTER

Since 1985, when six *ring-tailed lemurs* were set free on St. Catherines Island, the troop has totally adapted to its liberated state and expanded to 17 animals, including two born during the year. In August 1988, another release program was begun

The South American dwarf caiman is the seventh crocodilian to breed at the Bronx Zoo.





A crane chick at the Wildlife Survival Center gets close maternal care.

for the even more endangered *black and white ruffed lemur*, with five animals from four different institutions established at a home base 400 yards north of the ring-tails. Gradually, the new group has forayed deeper into the forest for longer periods of time. Far less social than ring-tails, ruffed lemurs live singly or in pairs and hide their babies around the forest rather than carry them. The free-ranging group will offer an opportunity to study this unusual behavior, to absorb some of the current overpopulation of ruffed lemurs being bred in zoos, and eventually, perhaps, to provide animals for repopulating the rain forests of eastern Madagascar.

In another release program, three chicks hatched by two nesting pairs of *Florida sandbill cranes* were lost to predators. This experience with chicks, however, may

prove valuable to the young parents during their many reproductive years ahead.

Bird breeding successes included the hatching of nine red-fronted macaws, three yellow-knobbed curassows, two Leadbeater's cockatoos, one Pesquet's parrot, and one bare-faced curassow (the fifth species of curassow to breed at St. Catherines). Palm cockatoo eggs were pulled from their nests, incubated, and sent for hatching and hand-rearing of the chicks to Richard Schubot in Loxahatchee, Florida, who is working closely with the zoo world's Palm Cockatoo Consortium.

After producing 80 fawns since 1977, the Center's *dama gazelles* were considered to have fulfilled their responsibility! They were dispersed during the winter to institutions where the climate is less humid and more suited to this North African desert species. Seven births were recorded for another desert antelope, the *Arabian oryx*, making the Center's herd one of the country's largest. These animals are being successfully reintroduced

the exhibits. At just about toddler height are holes to peer into, something to touch, like fish scales, and moving parts to watch. "If your child is old enough to walk, your child is old enough to enjoy the exhibit, and to learn something about aquatic animals and their environment," says Aquarium Director Louis Garibaldi. Of course, many an adult has been seen on his hands and knees, waiting for his chance to peer into a hole.

The Aquarium's educational programs already serve some 240,000 children and adults each year, and the new complex quadruples classroom space. The real classroom, though, is Discovery Cove itself, where visitors can see schooling fish, like menhaden or amberjack; a combined Atlantic and Pacific coral reef; and a kelp-encrusted North Atlantic rocky coast, each in a 12,000-gallon tank. In the seven Adaptation Alcoves, such marine animals as lungfish and turtles teach about "breathing," in and out of water; porcupine fish and octopus about "protecting"; flashlight fish about "seeing"; and grunts about "hearing."

On the way out visitors pass through a seaside village, where benefits derived from the ocean's natural resources become evident. Pharmaceuticals, foods, and plants from the sea are on exhibit here, and there is a ship's chandlery. There is also a display of gems, shells, scrimshaw, and other artifacts, and live cooking demonstrations. Ellie Fries tells the inside tales of furnishing the village, where it is a surprise to learn about the everyday foods and things that come from the sea. "The staff spent a year scrounging up items in antique shops and food stores and in marine salvage yards," explains Fries. "Then we had a windfall. Before we opened, the trustees came for dinner and a preview and the caterer served mussels in



Various fish tank shapes in Discovery Cove encourage viewer involvement.

garlic and tomato sauce. After dinner the staff collected all the mussel shells and scrubbed them clean. Now they appear in the village shops, along with Entenmann's cheesecake, because it has a thickener in it made from seaweed extract, and Preparation H, because it contains shark liver oil."

The village is a straightforward lesson on the interaction between people and the sea. It

to their ancestral homeland in Oman.

An extraordinary record of 42 hatchlings from three pairs of *radiated tortoises* increased the total captive population of this severely endangered species from Madagascar by nearly twenty percent. A radiated tortoise Species Survival Plan meeting in May on the island established important genetic and demographic guidelines for the captive population. □

NEW YORK AQUARIUM

Final work on the *George D. Ruggieri, S.J. Discovery Cove* in the first six months of 1989 called for a monumental effort by Aquarium curators, keepers, designers, craftsmen, instructors, and public relations staff. Goldstone & Hinz designed the building, David L. Manwarren Corp. the habitats, and Lyons and Zarembo, Inc. the graphics, all based on



concepts developed by the Aquarium's education and curatorial staffs (see story on page 16). During this time, the living collection for Discovery Cove was gradually assembled for the 66 tanks and exhibits in the 20,000-square-foot complex. Kelp was collected at Montauk for one of the three major tanks in the Adaptations area. Fishes and other marine organisms came from all over the world, but many were bred or raised at the Aquarium, including clownfish, blind cavefish, and schooling jacks.

Discovery Cove is also linked with other important developments at the Aquarium. The *Seawater Intake System*, which now supplies the entire Aquarium directly from the At-

lantic Ocean, was started up in December, in time to serve the added water needs of the new building. And the *food culture system* created in the Osborn Laboratories of Marine Sciences will be extremely important in feeding newly hatched fishes and a population of animals that has been doubled by the addition of Discovery Cove (see story on page 28).

Other breeding successes included the birth of a baby harbor seal on May 16. She was named Elga, in honor of Elga Gimbel, a long-time supporter of the New York Zoological Society and widow of the famed underwater explorer and NYZS Trustee Peter Gimbel.

The Aquarium's collection of *coral reef fish* was significantly expanded by Education Director Dr. Erwin Ernst's expedition with CEDAM (Conservation Education Diving Archaeology Museums) to

is the conclusion of an experience meant to tell us about the importance of the sea's health to the future of our planet, and to entertain us with the crash of a wave, the colors of a coral reef, and the antics of a clownfish.

Mother Nature's Sewage Treatment Plant

Three acres of wetland, 69 species of plants, and rare and exotic ducks from Europe, Asia, Africa, North and South America, Greenland, and Iceland are all part of the new John Pierrepont Wildfowl Marsh at the Bronx Zoo. What was once the aging stone and concrete Wildfowl Pond, and long ago the Aquatic Rodents' Pond and Aquatic Mammals' Pond, is now a natural landscape, thanks to technology.

"It's not a duck pond," says Curator Chris Sheppard. "It's a representation of a freshwater marsh." In nature, the plants in a marsh purify the water, cleansing it of pollutants. Nutrients flowing in from the surrounding soil fuel the growth of plants, which through photosynthesis release oxygen into the water. The plants also serve as food for aquatic animals. As the plants decompose, they add more nutrients to the water. Teeming with life, marshes are among the most productive habitats on Earth.

The marshes of North America, along with other wetlands such as swamps and bogs, are rapidly disappearing. Since the first European settlers arrived in the New World, over 50 percent of our wetlands have been lost, and more is lost each year. Millions of ducks and other wildfowl, and nearly one third of the nation's rare plants and animals, depend on these wetlands, which comprise only about five percent of the United States. Marshes around the world are similarly threatened.

Seven years and 1,000 pounds later, Nuka the walrus is still an Aquarium crowd-pleaser.





Opening day at the John Pierrepont Wildfowl Marsh on May 7, 1989 honored the new exhibition's namesake (right).

Wildfowl Marsh is designed to educate visitors about the fundamental significance of wetlands and how important it is to conserve them. It opened, quite appropriately, on a drizzly day in June to a throng of umbrella-laden guests. They were there as well to honor long-time NYZS Trustee and Vice-president John Pierrepont, for whom the marsh is named. Perched on the wooden bridge they could see the wildfowl nesting areas and hear the sounds of moving water generated by the pond's experimental circulation system. Submerged and hidden by grasses and algae, pumps pull the water from the bottom of the pond and propel it to the outer edges of the marsh. The water then flows through the soil and gravel and is purified as it trickles back through the marsh and into the pond.

And the ducks, eating all that painstakingly placed vegetation, are wonderful to watch, too.

the Caribbean in July 1988. Live corals were donated by the U.S. Fish and Wildlife Service from confiscated shipments that had been illegally imported. The Aquarium was able to supply local fishes—scarobins, kingfish, striped bass, bluefish, and stargazers—to Tokyo's new Sea Life Park, scheduled to open this fall.

Research is being conducted by the Marine Mammal and Training Department, in cooperation with the Canadian Department of Fisheries and Oceans (CDFO), to develop a non-invasive method of tagging wild *beluga* *wbales*. Test bands have been placed on the pectoral fins of two of the Aquarium's six belugas. The bands are examined for durability, color change, and their effect on the animals' skin. When completed, the project will enable the CDFO to tag wild *beluga* populations in the Churchill and St. Lawrence rivers and to study behavior, migration,

and mating patterns without interfering with the whales' normal routines.

Newly, the Aquarium's adult male *beluga*, is the subject of a *semen collection* project which may lead to the artificial insemination of his one-time mate, Kathi. Kathi gave birth to a calf in 1981, but the couple has yet to produce additional offspring. Success would be a first for cetaceans and a major breeding breakthrough. □

OSBORN LABORATORIES OF MARINE SCIENCES

Fieldwork by Dr. Klaus Kallman in the Rio Panuco Basin of eastern Mexico turned up three previously unknown species of swordtail in the genus *Xiphophorus*, which has been the basis for *genetic studies* at the New York Aquarium for 50 years. The nine Panuco species are more closely related to each other than to swordtails farther south, but the large number of species in a relatively small area (180 by 45 miles) is probably due to natural topographical barriers.

Beluga *wbales* Winston and Natasha are not shy about their relationship.





Genetic lab work concentrated on the maturation timing of the 45 sex-linked genotypes that determine size and age at sexual maturity in southern platyfish, factors that are important in the adaptive capabilities of these species. This is the first time that the genetics of a life-history trait has been worked out in any species.

The pathology laboratory under Dr. Paul Cheung identified and treated bacterial diseases in the chambered nautilus and sandbar shark (the latter with the Maritime Center

of Norwalk). An unusual occurrence of aspergilliosis, common in birds, was cured in a marine angelfish. □

CITY ZOOS PROJECT

The *Central Park Zoo* reopened on August 8, 1988, the first of three City zoos that the New York Zoological Society has agreed to redesign and ultimately manage for the City's Department of Parks and Recreation. On hand were hundreds of visitors, children from the Parks Department's Day Camp Program, City officials, major donors to the Zoo, NYZS President Howard Phipps, Jr., City Zoos Director

The two polar bears in the Central Park Zoo's Polar Circle were joined by a third in March 1989.



Baby Boom In The Tropic Zone

The birds in the Central Park Zoo's Tropic Zone are breeding like crazy. Pairs of eight species have fledged chicks, a ninth has had eggs, and a tenth is now getting acquainted. Mixed-species exhibits sometimes pose problems to bird breeding, but the Tropic Zone birds appear to be a happy group.

The Tropic Zone is a thriving natural environment, with great tree trunks soaring upward and ample moisture from a cascading waterfall. An array of other foliage, skillfully nurtured by CPZ Horticulturist Nancy Tim and her staff, makes the Tropic Zone a remarkably convincing representation of a tropical rain forest. But, because the exhibit is so new, no one expected the birds to breed so successfully during the first year. Normally the adjustment period is much longer.

Yet, they are breeding. And this is important for the future of the exhibit and for the possible breeding of birds in zoos. Curator James Murtaugh attributes this success to prudent choices in the species selected for the exhibit, and to the constant care and vigilance of the keepers. Most of the species chosen are social species. It was hoped they would do well in a densely populated environment and would not be upset by two-legged visitors. In fact, the silver-eared mesia have built a nest on a branch hanging over the visitor walkway, a mere three or four feet above people's heads.

The keepers, in particular James Mejeur and Bob Ramsey, monitor and care for the birds individually, recording mating, nesting, and breeding habits. They have discreetly provided nesting materials, some natural, some synthetic, to encourage the birds to start building and, if need be, they even intervene. The pink-necked doves,



Chicks of eight different species, including this orange-beaked ground thrush, have hatched and fledged in the Tropic Zone.

for instance, lost their first egg when it fell through a loose and haphazard structure. The keepers simply used wire to bind the nest more tightly together. The next egg stayed put and now a chick has fledged and is doing well. Also, in the wild, growing chicks get extra protein from their parents. In the Tropic Zone, James and Bob provide the insects.

In addition to the birds, other animals are also breeding in the Tropic Zone. Assistant Curator of Animals Peter Brazaitis, who is responsible for the reptiles and amphibians, says the Cuban anole, a lizard, is not particularly rare but almost never breeds in captivity. Yet three anole babies have been born this year. The first flying gekko baby was born early this summer, and the leafcutter ants, extremely sensitive to heat and humidity, will soon get a new ventilation system, enabling them to get back on the production line.

Richard Lattis, Park Commissioner Henry Stern, and Mayor Edward Koch, who threw out the first fish to Fin, a California sea lion. Work began at the *Flushing Meadows Zoo* in Queens on the same day and was scheduled to get underway at the Prospect Park Zoo in Brooklyn in July.

In its first eleven months, the 5.5-acre *Central Park Zoo* attracted 1,134,190 visitors, with a peak day of almost 18,000. On view in the tropical, temperate, and polar zones were more than 600 animals of 97 species in a setting of profusely planted gardens and habitat exhibits.

In March, a two-year-old female polar bear arrived from the Gelsenkirchen Zoo in West Germany to join the three-year-old male and female already

in residence. In the Temperate Territory, two *muntjac* were acquired in June to share the Himalayan foothill environment with red pandas, mandarin ducks, and Burmese mountain tortoises. *Breeding* exceeded expectations, with more than 170 births and hatchings of 20 species, including eight bird species in the Tropic Zone and two species of frog (see page 22)

At the *Flushing Meadows Zoo*, construction is being managed by Lehrer/McGovern/Bovis, and exhibits are being built by the Larson Company of Tucson, Arizona. Keeper recruitment began so that it will be possible to train a staff before animals are acquired.

Most of the animals in the *Prospect Park Zoo* were moved to new homes in preparation for the groundbreaking and construction. After the initial contract bidding, some program changes were made to meet budget requirements.

Six babies have been born in the Central Park Zoo's snow monkey colony.





EXHIBITION AND GRAPHIC ARTS

The department's landscape architects, exhibition designers, artists, sculptors, graphic designers, fabricators, and horticulturists were out in force on a myriad of projects at the Bronx Zoo throughout the year. With an enormous effort and the assistance of outside contractors, they transformed the 81-year-old Elephant House and its 4 1/2-acre grounds into the *Keith W. Johnson Zoo Center* (see story on page 11). While the Center neared completion, the *John Pierrepoint Wildfowl Marsh* opened on June 7, 1989. In hip boots and short sleeves, horticulture staff planted semiaquatic species and such wildflowers as fire pink, Joe-pye-weed, and boneset right up to the opening (see page 20).

A third project, the two-and-one-half-acre *Baboon Plateau* and *African Village*, was well underway for scheduled opening in 1990. The Pla-

teau area, with its imposing grass-covered hills and rocky escarpments for Ethiopian wildlife—gelada baboons, ibex, hyrax—was largely complete, as work began on the Plaza's public areas, viewing blinds, classroom, and other buildings in a West African style.

In addition to interpretive graphics for Wildfowl Marsh and Zoo Center, where the powerful indoor galleries were created by Joseph Wetzel Associates, the department's *graphics specialists* designed animal labels, brochures, SSP studbooks, promotional materials, and visitor literature. New color-coded graphics were installed at the entrances of the three major parking areas. At the entry pylons, visitors can now learn about the Society and plan their visit to the Zoo.

Capital planning involved the creation of a

More than 20,000 plants bring the habitats and gardens of Zoo Center to life.



Success In Breeding Rare Red Birds Of Paradise

Red birds of paradise are found in the wild only on one small island near the large island of New Guinea. They are among the most beautiful and spectacular of all birds, and the males are known to have a most unusual ritual of dances, accompanied by songs and whistles. The males collect in all-male groups and perform their ritual with great zeal, advertising their availability to females. Until a female arrives, it appears to the observer as if the males are performing for each other.

Red bird of paradise breeding habits have never been extensively studied in the wild. But, intermittently during the year, lone females have been seen to approach a group of males in full breeding regalia. Although dominance is not necessarily apparent to the human observer, speculation has it that the female identifies the dominant male and mates with him. This too has not yet been confirmed by studies in the wild. She then goes off into the forest to nest, and then to hatch and raise the chicks on her own.

Until recently, red birds of paradise were almost never kept or bred in captivity. Curator of Ornithology Christine Sheppard says, "You can't just put them together in a cage and watch them go." Their peculiar performances require enough space for males to display to each other in groups and for females to retreat to safe territory after mating. Here at the Bronx Zoo, though, five red bird of paradise chicks are thriving.

The birds are set up in a unique, almost space-age arrangement of enclosures created by Senior Keeper Kurt Hundgen. The males can see each other, display to each other, and engage in their mating ritual. The female too can see the males but is given physical access only to one at a



time. Over a period of weeks or months, the female may be given access to more than one male. Eventually, she nests.

The breeding process, though, remains much of a mystery. Moreover, if a female has consorted with several males, it is impossible to tell which birds have bred and which is the father of



A special blind is used by researcher Wendy Worth and Keeper Kurt Hundgen to observe bird of paradise mating rituals.

any new chick. At present, banks and military installations can afford 24-hour camera surveillance, but red bird of paradise breeding programs cannot. Instead, researcher Wendy Worth is faced with the task of watching the birds' behavior from one of several blinds, so as not to disturb them. This might mean sitting in a tent under a bush next to one of the outdoor cages, or in a shed with a slot for a window cut into it. From these vantage points she has learned a great deal about the birds' mating rituals and breeding habits.

As for the parentage, Geneticist George Amato is using genetic testing to determine red bird of paradise lineage. The Society has a rather strict hands-off policy with regard to the

major presentation for trustees, City officials, and other potential donors on current and future projects and programs in wildlife exhibition, conservation, education, and research at all NYZS divisions. Central among those projects is the renewal of *Astor Court*, for which architects Davis, Brody & Associates proceeded with schematic planning. Funds were budgeted by the City for the conversion of the old Bird House into administrative offices, and the feasibility of a flooded Amazon forest is being explored for the Lion House.

As its roofs and floors were being repaired and replaced, the *World of Birds* was being reconsidered as a series of environments for the changing collection. Plans were also being developed for an upgraded circulation land-use plan, a new service yard, an interpretive pedestrian spine, and new perimeter entrances.

Planting at Zoo Center, Wildfowl Marsh, and Baboon Plateau occupied much of the *Horticulture Department's* year. Other important projects included the planting of willow trees for the white-handed gibbons on their island in Cope Lake, and replanting around the Polar Bears, Eagles and Vultures, and Gorillas to create better and safer views. Several exhibits in the Aquatic Bird House were replanted, and *JungleWorld* received new irrigation lines, large trees for the gibbon forest, and a variety of new plants in public areas.

Funding by the Nor-

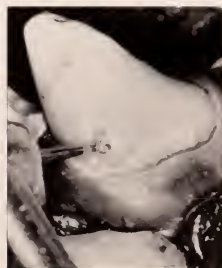
cross Wildlife Foundation financed a study of *winter browse production* and the planning of a new energy-efficient *greenhouse*. A nationwide survey of pasture management in zoos was conducted under the *Horticulture Research Internship* funded by the Leon Lowenstein Foundation.

ANIMAL HEALTH

The use of a flexible *endoscope* enabled Dr. Robert Cook to save the lives of several animals by retrieving objects from their stomachs without performing major surgery. An endangered *Cuban crocodile* that swallowed watch parts and several coins was suffering from zinc poisoning. A *sea lion* on *Astor Court* also swallowed a coin, and a *penguin* in Central Park was imperiled by a piece of wire. All three are now completely recovered.

Two members of the Bronx Zoo's valued lowland *gorilla* group underwent major medical procedures. Successful surgery to repair inguinal hernias

Six hours of root-canal work on the polar bear Ida involved Zoo veterinarians and consulting doctors.





was performed on four-month-old Oliver T. Barnes by a team of pediatric surgeons and anesthesiologists. And nine-year-old Kelly, after undergoing MRI (Magnetic Resonance Imaging) and CT (Computer Tomography) scans of his brain, was determined by a neurology team at Montefiore Hospital to have suffered from a disabling infection early in life. Fortunately, his occasional seizures can be controlled with medication, and he continues to function well, despite a partially paralyzed right arm, as big brother to Tunko, Tumai, and Triska.

At the Central Park Zoo, a successful six-hour bilateral root-canal was performed on the polar bear Ida with the assistance of consulting human and veterinary dentists to cure abscessed canine teeth. Another kind of dental problem, afflicting Nuka, the Aquarium's 1,200-pound wal-

rus, was treated in a four-hour procedure by removing regrown tusks.

With the appointment of Dr. Tracey McNamara as staff pathologist, the Bronx Zoo became only the fourth zoo in the country to provide full-time pathology services.

Dr. Anne Lewis was named pathology resident. Under the expanded program, eight previously unreported viral, bacterial, and parasitic diseases, including the "pudu pox," were detected and treated. Joining the clinical staff was Dr. David Kenny as veterinary resident.

Operations of the Bronx Zoo's animal commissary, managed by George Fielding, have been consolidated under the Nutrition Program for greater efficiency in administering the diets of nearly 4,000 animals. Diet revisions have been completed for most small mammals and are proceeding for soft-billed and aquatic birds.

Undergraduate students from Manhattan College conducted two important nutrition research pro-



Hand-feeding is one part of raising red bird of paradise chicks.

handling of animals. For this reason, and because removing blood from a small bird can be dangerous, Amato is studying the possibility of gleaning sufficient data from tests on feathers.

Meanwhile, the breeding program proceeds. The males continue to engage in their ritual, showing off for each other in a manner that appears to attract females. And with each successive breeding season, keeper Hundgen refines the maze of interconnecting cages, tunnels, and trap doors, maximizing the males' ability to display toward one another while at the same time appealing to the females' need for territorial security.

Black Rhinos United In One Gene Pool

The black rhinoceros is one of the most endangered species in the world. From about 65,000 animals in Africa in 1972, the population has dropped

The "Pudu Pox," a previously unknown virus in this small South American deer, was identified by Pathologist Dr. Tracey McNamara.





dramatically, primarily due to poaching, to less than 3,500. And it is fragmented into isolated groups, many of which are too small to be viable. Translocation is their only hope. However, mixing dissimilar animals can be as threatening to the survival of the species as reduced genetic diversity. For this reason, the genetics of the remaining black rhinos must be understood.

The Society's genetics program, launched in 1988 by the Animal Health Center in collaboration with the Animal Management Services Department and Columbia University, is now studying black rhinos. Geneticist George Amato, former research associate at Yale University, who recently joined the NYZS research staff, has found that the several groups of black rhinos once considered subspecies are not genetically distinct from one another in any major way. Now, all existing black rhinos can be considered members of one single large gene pool. Continued DNA work is expected to confirm these findings, though one subspecies, the desert black rhino of Namibia, remains to be studied.

"In the past," says Amato, "subspecies distinctions have hampered black rhino captive breeding programs. A larger available gene pool means that any given rhino has a greater number of potential mates. In other words, all black rhinos are genetically similar enough to be part of a single breeding program."

A larger available gene pool also means that captive individuals bred from parents of different subspecies from different geographical areas are, in reality, not very different. If necessary, rhinos can now be moved from one geographic area to another and placed with any of the remaining 3,500. This, of course, provides

jects at the Zoo. One found that the wild cavy does not produce its own vitamin C and must rely on dietary sources, a fact that indicates the need for vitamin supplements. The other study examined lead levels in Zoo animals. Research on vitamins A and E in whole fish used to feed zoo and aquarium animals revealed the need to supplement diets for piscivorous mammals, birds, and reptiles.

Vitamin E research produced new data on levels in the blood of gorillas (they are similar to humans); sharks, dolphins, and whales (in joint studies with Sea World); and black rhinos in Africa (they vary according to location). The absorption and availability of vitamin E in elephants is the subject of a collaborative study by the NYZS veterinary and mammals staffs, researchers at NYU, and the National Research Council of Canada.

In another cooperative study, funded in part by the U.S. Fish and Wildlife Service, Nutrition Technician *Jane McGuire* is measuring the protein, fat, fiber, mineral, and vitamin levels of *prairie dogs*, the principal prey food of endangered *black-footed ferrets*.

Nutritionist *Dr. Ellen Dierenfeld* served in several AAZPA capacities: as a member of the Nutrition Subcommittee of the Animal Health Committee and as nutrition advisor to the Species Survival Plans for the Asian elephant and Puerto Rican crested toad. She was a member of the Cheetah Research



Dr. Robert Cook (right) and assistant accompany a false gharial in the Animal Health Center van.

Council, Coordinator of Nutrition Research for the Captive Breeding Specialist Group Rhino Program in North America, and panelist for a new National Science Foundation research thrust in conservation biology. □

ANIMAL MANAGEMENT SERVICES

Questions of genetic integrity and species identification, which are crucial in breeding and management programs, are now being addressed by *George Amato*, the Society's first full-time geneticist. Dr. Amato has already made an important discovery about the gene pool of severely threatened black rhinos (see page 26).

Other methods of animal identification are being studied by *Susan Elbin* in a two-year project funded by the Institute of Museum Services. Tech-



Associate Curator Dan Wharton's record of the barasingha deer in captivity includes the Bronx Zoo herd.

niques for differentiating individual animals at the Bronx Zoo, which is essential to health care, breeding, and other animal management decisions, are being considered in a wide variety of species.

As Species Coordinator for the Snow Leopard Species Survival Plan (SSP) and Regional Studbook Keeper for the Western Lowland Gorilla, Curator Dan Wharton has involved in more than 100 recommendations for managing and breeding these species.

He is also tracing the barasingha deer's long

history in captivity for that species' SSP. The *Koala Diet*, formulated under a project led by Dr. Wharton, was patented by the New York Zoological Society and the University of Sydney for eventual use in zoos as a substitute for hard-to-get eucalyptus leaves.

Coordinator of Research Michael Hutchins assisted on Bronx Zoo studies of endangered river terrapins and birds of paradise and will convene a North American regional advisory committee on monotremes and marsupials under the AAZPA.

The Workshop on Applying Behavioral Research to Zoo Animal Management, co-organized by Dr. Hutchins for the

greater flexibility to wildlife and park managers, and is an excellent example of the important role genetics research can play in conservation efforts.

The Great Fish Food Chain

With the opening of Discovery Cove at the New York Aquarium, 2,500 specimens were added to the Aquarium's collection of aquatic animals. Like all living things, they require a continuous and nutritious supply of food. This need has precipitated the creation of a fish food chain, a breeding and feeding cycle.

Scientists at the Aquarium's Osborn Laboratories of Marine Sciences are culturing the food that larval fish require by growing algae and feeding it to rotifers, microscopic, multicellular invertebrates that double their population every 24 hours, as long as they have enough algae to eat. To many young fish, rotifers do very well as breakfast, lunch, and dinner. Slightly older fish feed on brine shrimp, which are also raised on algae for a higher nutritional value.

At the same time, under the supervision of Collections Manager Paul Sieswerda, the Aquarium has been able to simulate the temperature, salinity, and pH conditions under which some fish normally spawn. The food chain now makes it possible to actually breed fish.

The likely key to the program's success, says Sieswerda, is the team of keepers, Werner Schreiner and Robert Fournier. "They have taken the foundation established in the precise and sterile conditions of the laboratory and added the personal touch." Schreiner has many years of experience and an indefinable insight into the needs of the animals. Fournier is a recent graduate, eager to contribute thorough background re-



search to the project. Their patience and persistence in creating a self-sustaining food chain has already contributed to success in spawning and rearing several species of clownfish.

The food chain will hopefully enable the Aquarium to breed fish that have never been raised in captivity. "In the future," says Sieswerda, "the program may be helpful in propagating rare and endangered species of fish, perhaps ensuring their survival." ■

In the Aquarium's feeding cycle (clockwise from upper left), algae feed rotifers and brine shrimp, which in turn feed young clownfish.



fourth year, received a 1988 Certificate of Merit from the American Association of ZooKeepers.

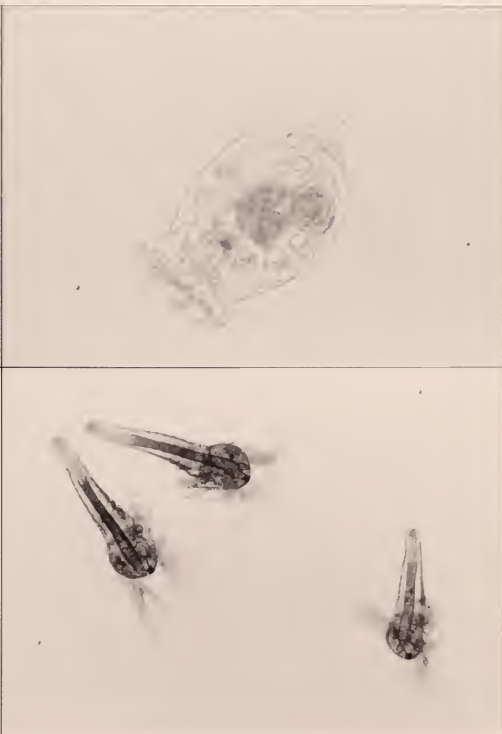
Twenty-one new keepers graduated from the six-month *Keeper Training Program*, and 100 keepers attended a four-day seminar on Species Survival Plans.

Animal Records arranged 190 animal transfers to and from other zoos and applied for sixteen Federal permits for exchanges with foreign zoos.

With the new and historical animal records

added last year, the Bronx Zoo's computerized *Animal Record Keeping System* (ARKS) now includes more than 16,000 entries.

Databases were established by Librarian-Archivist *Stere Johnson* for species at the Central Park Zoo, in Species Survival Plans, and being reintroduced or translocated in the wild. A grant from Trustee Nixon Griffis funded subscription to the Compact Cambridge program of Life Sciences Collection. Archival projects included microfilming early Zoo scrapbooks.





Animal Censuses (at December 31, 1988)

BRONX ZOO

Mammals	Species and Subspecies	Specimens in Zoo	Births/Hatchings
Marsupialia—Kangaroos, phalangers, etc.	2	57	13
Insectivora—Hedgehogs	1	15	4
Chiroptera—Bats	8	467	253
Primates—Apes, monkeys, marmosets, etc.	24	201	55
Edentata—Armadillos, sloths, anteaters	1	2	0
Lagomorpha—Rabbits	1	4	0
Rodentia—Squirrels, mice, porcupines, etc.	46	321	297
Carnivora—Bears, raccoons, cats, dogs, etc.	23	114	33
Pinnipedia—Sea lions, etc.	1	12	4
Proboscidea—Elephants	1	5	0
Hyracoidea—Hyraxes	1	1	0
Perissodactyla—Horses, rhinoceroses, etc.	4	44	8
Artiodactyla—Cattle, sheep, antelope, etc.	27	486	171
Totals	140	1,729	838

Amphibians and Reptiles	Species and Subspecies	Specimens in Zoo	Births/Hatchings
Caudata—Salamanders	3	8	0
Anura—Frogs, toads	16	57	0
Chelonia—Turtles	44	286	17
Crocodylia—Alligators, caimans, crocodiles	12	109	13
Squamata (Sauria)—Lizards	23	81	0
Squamata (Serpentes)—Snakes	48	221	103
Totals	147	762	133

Birds	Species and Subspecies	Specimens in Zoo	Births/Hatchings
Struthioniformes—Ostriches	1	3	0
Rheiformes—Rheas	1	6	0
Casuariiformes—Cassowaries, emu	2	4	0
Tinamiformes—Tinamous	2	4	0
Sphenisciformes—Penguins	2	8	0
Pelicaniformes—Pelicans, cormorants	3	6	0
Ciconiiformes—Hérons, storks, flamingos, etc.	16	119	16
Anseriformes—Swans, ducks, geese, screamers	33	95	22
Falconiformes—Vultures, hawks, eagles	6	16	0
Galliformes—Pheasant, quail, etc.	25	84	20
Gruiformes—Hemipodes, cranes, rails, etc.	16	58	7
Charadriiformes—Plovers, gulls, etc.	23	131	18
Columbiformes—Pigeons, doves	11	36	16
Psittaciformes—Parrots, etc.	14	47	15
Cuculiformes—Touracos	5	15	5
Strigiformes—Owls	8	10	1
Caprimulgiformes—Frogmouths	1	6	0
Apodiformes—Hummingbirds	2	3	4
Coliiformes—Mousebirds	1	2	0
Coraciiformes—Kingfishers, hornbills, etc.	18	33	4
Piciformes—Barbets, toucans, woodpeckers	5	19	14
Passeriformes—Perching birds	92	272	32
Totals	287	977	172

Bronx Zoo Census	574	3,468	1,143
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N.B. The Bronx Zoo census includes 1,308 animals of 195 endangered, threatened, or vulnerable species. 373 animals were loaned to 86 other zoos, and 221 animals were loaned from 59 zoos.



CHILDREN'S ZOO, BRONX ZOO

Mammals	Species and Subspecies	Specimens in Zoo	Births/Hatchings
Marsupialia—Opossum	1	1	0
Insectivora—Hedgehogs	3	10	4
Edentata—Armadillos	2	2	0
Lagomorpha—Rabbits	1	13	0
Rodentia—Mice, porcupines, etc.	5	19	0
Carnivora—Foxes, ferrets	7	19	4
Perissodactyla—Horses	2	4	0
Artiodactyla—Goats, sheep, camels, etc.	5	37	5
Totals	26	105	13

Birds	Species and Subspecies	Specimens in Zoo	Births/Hatchings
Ciconiiformes—Hérons	3	14	18
Anseriformes—Ducks, geese	10	68	0
Falconiformes—Falcons	1	4	0
Galliformes—Chickens	2	48	42
Columbiformes—Doves	2	3	0
Psittaciformes—Parrots	9	10	0
Strigiformes—Owls	3	3	0
Caprimulgiformes—Frogmouths	1	1	0
Piciformes—Toucans	1	1	0
Passeriformes—Perching birds	1	1	0
Totals	33	153	60

Amphibians and Reptiles	Species and Subspecies	Specimens in Zoo	Births/Hatchings
Caudata—Salamanders	1	10	0
Anura—Frogs, toads	3	25	0
Chelononia—Turtles	8	50	2
Crocodylia—Alligators	1	9	0
Squamata (Sauria)—Lizards	5	10	0
Squamata (Serpentes)—Snakes	6	26	11
Totals	24	130	13
Children's Zoo Census	83	388	86

N.B. The Children's Zoo census includes 15 animals of 10 endangered, threatened, or vulnerable species. 1 animal was on loan to another zoo, and 13 were on loan from 4 other zoos.


**WILDLIFE SURVIVAL CENTER,
ST. CATHERINES ISLAND, GEORGIA**

Mammals	Species and Subspecies	Specimens in Zoo	Births/Hatchings
Marsupialia—Wallabies	1	11	4
Primates—Lemurs, macaques	7	58	13
Perissodactyla—Zebras	1	13	5
Artiodactyla—Antelope	6	71	33
Totals	15	153	55

Birds	Species and Subspecies	Specimens in Zoo	Births/Hatchings
Ciconiiformes—Storks	1	6	0
Anseriformes—Screamers, geese	1	0	0
Galliformes—Pheasants	5	13	9
Gruiformes—Cranes, bustards	9	46	2
Columbiformes—Pigeons	1	0	0
Psittaciformes—Parrots	9	46	11
Coraciiformes—Hornbills	5	10	0
Totals	31	121	22

Reptiles	Species and Subspecies	Specimens in Zoo	Births/Hatchings
Chelonia—Turtles	3	64	28
Wildlife Survival Center Census	49	338	105

N.B. The WSC census includes 238 animals of 32 endangered species. 94 animals were on loan to 33 other zoos and 52 were on loan from 19 other zoos.

CENTRAL PARK ZOO

Mammals	Species and Subspecies	Specimens in Zoo	Births/Hatchings
Chiroptera—Bats	2	150	100
Primates—Monkeys	4	35	6
Rodentia—Accouchis	1	2	0
Carnivora—Bears, otters, pandas	5	11	0
Pinnipedia—Seals, sea lions	2	7	0
Artiodactyla—Deer	1	2	1
Totals	15	207	107

Birds	Species and Subspecies	Specimens in Zoo	Births/Hatchings
Sphenisciformes—Penguins	2	38	0
Anseriformes—Swans, ducks	2	8	0
Galliformes—Partridges	1	4	0
Charadriiformes—Puffins	1	22	0
Columbiformes—Doves	3	6	1
Psittaciformes—Parrots	1	2	0
Strigiformes—Owls	1	1	0
Piciformes—Toucans	2	4	0
Passeriformes—Perching birds	25	101	23
Totals	38	186	24

Amphibians and Reptiles	Species and Subspecies	Specimens in Zoo	Births/Hatchings
Anura—Toads and frogs	15	97	33
Chelonia—Turtles	10	60	2
Crocodylia—Caiman, alligators	1	5	0
Squamata Sauria—Lizards	11	40	6
Squamata Serpentes—Snakes	7	15	0
Totals	44	217	41

Central Park Zoo Census	97	610	172
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NEW YORK AQUARIUM

Phylum	Class	Order	Species	Specimens
Chordata	Chondrichthyes—			
	Cartilaginous			
	fishes: Sharks,			
	rays, chimeras			
		Heterodontiformes—		
		Horn sharks	1	1
		Squaliformes—		
		Typical sharks:		
		Sand tigers, lemons	4	16
		Rajiformes—Rays	3	9
Osteichthyes—	Bony fishes			
		Lepidosireniformes—		
		Lungfishes	1	2
		Semionotiformes—		
		Garfish	1	6
		Amiiformes—Bowfin	1	6
		Elopiformes—Tarpon,		
		bonefish	1	4
		Anguilliformes—Eels,		
		morays	9	18
		Osteoglossiformes—		
		Arawana, arapaima,		
		knife-fish	3	6
		Salmoniformes—		
		Trouts	3	36
		Cypriniformes—		
		Minnows, carp,		
		cavefish, piranha,		
		tetra	7	613
		Batrachoidiformes—		
		Toadfishes	3	42
		Atheriniformes—		
		Platys, flyingfish,		
		swordtails, killifish,		
		silversides, guppies,		
		needlefish	1	2
		Beryciformes—		
		Squirrelfishes,		
		flashlight fish	5	18
		Gasterosteiformes—		
		Seahorses, pipefish	3	10
		Perciformes—Tangs,		
		sea basses, porgies,		
		cichlids, perches,		
		clownfish, etc.	144	1,382
		Pleuronectiformes—		
		Flatfishes	4	19
		Tetraodontiformes—		
		Puffers, boxfish,		
		triggerfish	13	27

Phylum	Class	Order	Species	Specimens
	Reptilia	Chelonia—Sea turtles	4	10
	Aves	Sphenisciformes—		
		Penguins	1	52
	Mammalia	Pinnipedia—Seals,		
		sea lions, walrus	4	17
		Cetacea—Whales,		
		dolphins	2	9
Cnidaria	Anthozoa—Corals, anemones		25	numerous
Annelida	Polychaeta—Marine worms		10	500
Arthropoda	Crustacea—Lobsters, shrimps,			
		crabs, isopods, etc.	10	89
	Arachnida—Horseshoe crab		1	15
Mollusca	Gastropoda—Snails			
		Cephalopoda—Octopus, nautilus	3	60
		cuttlefish	5	39
Echino- dermata	Asteroidea—Starfish			
			11	49
		Holothuroidea—Sea cucumbers	1	15
	Echinoidea—Sea urchins		3	35
Totals			287	3,107+



WILDLIFE CONSERVATION INTERNATIONAL



udyard Kipling tells a tale of how the elephant got his trunk, down by the bank of the great, grey, green, greasy Limpopo River, in a tangle with a crocodile who bit the young elephant's nose and, holding on tight, pulled and pulled and pulled. Taken aback though he was, the elephant's child found that his new trunk was indeed a great help. With it he could pick up grasses from the ground or reach green leaves in the trees. It was a godsend really, a blessing that greatly enhanced the elephant's survival abilities.

If only the elephant's tusks had turned out to be a blessing of similar proportions.

African Elephant Alert

In days past elephants roamed the earth vulnerable only to the dangers that threaten any animal in the wild. Their tusks, as well as their trunks, are useful in removing the bark from trees, in uprooting bushes, in digging for water, and in jousting with rivals during breeding season.

Today the age of the elephant may be coming to an end. Fewer than 50,000 remain in Asia. In barely one decade the elephant population in Africa has been cut in half, to about 600,000 today. Humans, in their zeal for status or sexual prowess are responsible for the demise of these majestic animals. Elephant ivory commands a high

price for jewelry and trinkets, particularly in Hong Kong and Japan. The supply comes from poaching that is horrendous in its magnitude and brutality.

Even so, one might contend that a sufficient number of elephants remain to carry on into the future. But this may not be so. Elephants learn from other elephants about their territory and about appropriate foods to eat. They learn these things from the members of their matriarchal social group, from their mothers and aunts and sisters. Recently, poachers have been killing not only the older large bulls, but the older matriarchs, and young males and females of any age with tusks weighing only a pound or two. This means that the leaders and teachers are being wiped out. Herds of very young animals now wander the plains without guidance. And young motherless calves almost never survive.

Wildlife Conservation International has taken up the cause of the elephant and the rhinoceros more urgently than ever before. Last year's rhino rescue campaign, designed to publicize and combat the plight of this extremely endangered animal, has taken a strong step forward. In Kenya's Nakuru National Park WCI is working to establish a rhino sanctuary where rhinos will be protected by fences and trained guards. In Zimbabwe, which has a relatively large population of vulnerable rhinos,



WCI IN AFRICA

The most dramatic and urgent WCI initiatives in Africa are part of a collaborative effort to halt the poaching of elephants and black rhinos, an effort in which WCI Director David Western and other WCI scientists are playing key roles (see more on page 35). Regional WCI programs in two areas—East African Savannas and African Forests—included 43 projects in 17 countries at the end of the fiscal year.

In Kenya, where Western serves as coordinator for the savannas program assisted by WCI Conservation Officer Christopher Gakabu, projects are underway in several parks and reserves. Fencing has been erected along the north side of Nairobi Park, and Helen Gicohi is studying the effects of gradual insularization on park ecology. Fred Waue-ru is working with seventeen translocated black rhinos in Lake Nakuru Park. And Lucy Muthee and Wesley Henry are concerned with the impact of tourists on Maasai-Mara.

In Tanzania, Senior Staff Zoologist Patricia Moehlman continues her definitive field study of jackals. Still the key advisor in monitoring Ngorongoro Crater Conservation Area, she now plays a similar role in Ruaha, Tarangire, and Lake Manyara national parks. She is also surveying wild asses in Somalia to help establish management options for the species and its ecosystem.

As advisor to the Ethiopian Wildlife Conserva-



Elephant poaching destroys matriarchal groups, depriving young elephants of protection and guidance as they grow up.

tion Organisation, Associate Research Zoologist Chris Hillman directs conservation research, training, and education throughout Ethiopia, including Bale Mountain National Park. He is now based in the capital, Addis Ababa.

Rain-forest projects, coordinated by William Weber, stretch across equatorial Africa from Sierra Leone in the west through Zaire to Rwanda. Among them are two that received major funding from the U.S. Agency for International Development (USAID) during the year. One is James Powell's long-term biological inventory and training program in Cameroon's

WCI is supporting anti-poaching patrols using planes and other tracking equipment.

WCI Director Dr. David Western, who coordinates WCI's activities in East Africa, is now concentrating his attentions on elephants as well as rhinos. The emergency is already upon us. The elephants are being killed at the rate of 100–200 per day. During this past year Dr. Western has been instrumental in efforts to have the African elephant upgraded to Appendix I, the endangered species list, of the Convention on International Trade of Endangered Species, known as CITES.

Dr. Western and other conservationists have also had success in their efforts to impose a worldwide ban on ivory. President George Bush has declared that importing ivory to the United States from any country is now illegal. All twelve member countries of the European Community, including Great Britain, which still controls Hong Kong, have also imposed a ban. Even Japan has an-



nounced that it will curtail imports. The CITES listing would provide a means to implement the ban.

In Africa the ban is questioned by some countries, notably Zimbabwe, Botswana and South Africa, that use earnings from ivory sales to support conservation activities. Poaching, though, is motivated by greed. And Dr. Western emphasizes that, "elephants are more valuable as a continuing source of tourist income than they are as a finite resource plundered by indiscriminate poachers."

WCI and other organizations in the African Elephant Conservation Coordinating Group recently drafted a comprehensive campaign to stop what some have called elephant genocide. The goal, as stated in the group's working document, is, "to stem the drastic decline in the African elephant by stopping the illegal ivory trade" and targeting certain areas as elephant reserves. Other elements of the campaign include political activism directed toward the many varied governments involved, and education of the public, both in Africa and around

extremely diverse *Korup National Park*. Powell's previous pioneering work with *manatees* and coastal zone management is being continued in Ivory Coast by *Konadio Akoi*. The other is the Nyungwe Forest Project in *Rwanda* under *Rob Claussen*, with *Amy Vedder* in an advisory role, which also involves biological inventories and training, as well as tourism development and local education. In June 1989, the project organized and hosted, with the Rwandan government, a five-day regional workshop on "The Conservation and Management of Afromontane Forests" that was attended by 65 conservation professionals from Rwanda, Burundi, Zaire, and Uganda.

With new housing and office space nearly completed, the 20-year-old *Kibale Forest Project* in *Uganda* is moving in a new direction under *Andrew Johns* and *Isabirlye Basuta*. In cooperation with *Makerere University*, the project will maintain its traditional emphasis on research and training, with additional attention to issues concerning sustainable and multiple use management. In *Central African Republic*, the lowland gorilla study of *Richard Carroll* and *Michael Fay* has resulted in the creation of the Dzanga-Sangha Reserve. And in *Sierra Leone*, WCI's continued support of *John Oates* and the *Tiwai Island Project*, channeled through the local Conservation Foundation and the U.S. Peace Corps, may help to save, through edu-

cation and forest management, one of the few remaining areas of Guinean rain forest.

For WCI Associate Research Zoologists *Terese* and *John Hart*, studying the elusive *okapi* and its forest ecosystem in Zaire, improved protected status of the *Ituri Forest* remains a top priority. The Harts' work is complemented by their assistant *Rick Peterson's* WCI study of agricultural immigration trends. Another assistant of the Harts, *Claude Sikubwabo*, established a second research camp near Epula and then became the first professional biologist in the government's Institute for Nature Conservation.

Sikubwabo also ran the Zaire component of the comprehensive forest elephant survey that is being conducted by teams under the direction of *Richard Barnes* in Gabon, Congo, Cameroon, Equatorial Guinea, Zaire, and Central African Republic. The survey, showing that up to half of Africa's elephants live in forests, will be crucial in the pan-African effort to save the species. □

WCI IN THE AMERICAS

Although WCI maintains a strong interest in two significant North American projects—the recovering population of black-footed ferrets in Wyoming and the humpback whale conservation work of *Deborah Glockner-Ferrari* and *Mark Ferrari* in Hawaii—most New World support goes to three Latin American re-

Elephant remains left by poachers in the Central African Republic.





gions. There are now 44 projects in 14 countries from Mexico to Argentina.

Under Archie Carr III, Florida-based coordinator of the MesoAmerican and Caribbean Basin region, encouraging progress has been made by WCI scientists in the rain forests and along the Caribbean shores of Central America, despite unsettled political conditions. In the cross-border Greater Peten region of Mexico, Guatemala, and Belize, work continues toward the protection of vast tracts of pristine forest. Ignacio March is evaluating habitat in the area around Calakmul, Mexico, where UNESCO recently declared a forest biosphere reserve of 700,000 hectares. In Guatemala, Milton Cabrera is studying habitat use throughout the Peten, while Maria Jose Gonzalez-Fuster surveys the

Scarlet macaws and other parrots are a focus of WCI efforts in Peru to protect Amazonian rain forests.

status of the ocellated turkey, a key species in the area of Tikal.

Eventually, it is hoped that the Peten conservation region will extend into Belize, where ornithologist Bruce Miller is compiling ecological data in the areas of Caracol and Rio Bravo, and Carr has been a key figure in formulating a national conservation strategy over the past six years. The strategy also includes Belize's 150-mile-long barrier reef, for which the government may now declare a comprehensive management status. Carr and long-term researchers Jacque Carter and Janet Gibson have played important roles in these developments.

the world, so as to reduce the demand for ivory, in Europe, in the United States, and especially in Asia and Japan.

All That Glitters Is Not Gold

Gold rush. These words conjure up an image of California in the mid-1800s, when pioneers were lured to the new world's west coast, pans in hand, hoping to make their fortunes. Today the gold rush is a phenomenon of the developing world, where gold fever is exceptionally damaging to the environment, and where it gravely threatens urgently needed conservation action.

Many areas in which WCI is actively working are now plagued by gold mining. These include the Ituri and Maiko forests of Zaire, the Nyungwe Forest in Rwanda, the Apaporis Forest of Colombia, the Ailao Mountain Reserve of China, the southern forests of Ecuador, and southeast Asian forests in Papua New Guinea and Kalimantan. However, as WCI Conservation Officer Lisa Naughton says, "the biggest boom in gold mining today is occurring in the Amazonian forests where hundreds of thousands of miners scrambling for gold are having a disastrous impact on the environment and native peoples."

Especially affected are river systems and the surrounding forests. All methods ultimately destroy aquatic ecosystems, whether it is simple panning by individuals, or the use of pumps and hoses or heavy equipment brought in by major enterprises, both national and international. The results are heavy sedimentation, lowered oxygen levels and raised temperatures of the river water. Mercury, often used in on-site processing, poisons the rivers and the animals dependent on aquatic organisms. The surrounding forest is depleted of game due to



hunting by the miners and is further damaged by cutting for firewood and by the agricultural colonization that often follows mining activity.

In many cases the miners, particularly the panners, are local people making a subsistence living who have few economic alternatives. In addition, governments welcome large mining companies in the hope that gold will solve the problems of massive debt. Unfortunately, the miners are usually affected by mercury poisoning and subjected to appalling living conditions. Gold mining does not create a stable base for the local economy. In fact, the gold is often removed from the region without any compensation or taxes paid.

WCI has recently undertaken a program of conservation action in a seriously endangered Amazonian reserve, Ecuador's Podocarpus National Park. It is Ecuador's newest park, named

Panning for gold by thousands of prospectors and mining by more formidable methods are laying waste to rivers throughout the tropics.



NYZS volunteers at Punta Tombo, Argentina, help to weigh and band young Magellanic penguins.

As he continues to study cracids, oilbirds, flamingos, and parrots in Venezuela, *Stuart Strahl* also coordinates projects in the entire region of *Tropical South America*. Included are many field studies by graduate biologists in Venezuela, Colombia, Ecuador, and Peru and the beginning of an effort by Nikiritare Indians and others, advised by Strahl, to preserve virgin forest in Amazonian Venezuela.

In Peru's Manu National Park, *Charles Munn* has found that macaws, jeopardized by deforestation, hunting, and the pet trade, are additionally threatened by the fact that they breed more slowly than was thought. With his guidance, the voluntary Association for the Conservation of Southern Forests has become a major force for improving government policies in the Amazon, educating the

public, and promoting nature tourism.

New tropical initiatives are underway in Ecuador, led by WCI Conservation Officer *Lisa Naughton* and *Luis Suarez*, professor of zoology at Catholic University of Quito. In Podocarpus National Park, the Defenders of Andean Nature, a local group, is involved in education, lobbying local officials, and studying the effects of gold-mining on the environment (see page 38), while oil-drilling and its impact on cracid species are issues in Yasuni National Park. The beginning of a Brazilian campaign includes *Eduardo Martins'* ecological study of rubber-tapping in Acre Province and *Marcio Ayres'* survey of flooded Amazon forest.

In *Temperate South America*, coordinated by Senior Conservationist *William Conway*, a regional plan was established under *Mario Parada* for protecting flamingos in the altiplano of Chile, Bolivia, and Argentina. Along the coast of Argentina, the Magellanic penguins at Punta Tombo, still the domain of *Dee Boersma*, flourished during the breeding season, and some headway was made in protecting the seabird and mammal populations of Punta Leon, largely through the efforts of *Claudio Campagna*, *Graham Harris*, and *Pablo Yorio*. With bird populations on the Atlantic coast at lower levels than expected, however, the need for more protected areas has become all the more evident. □



WCI IN ASIA

Recognizing the speed with which Asian forests and other ecosystems are being destroyed, WCI has focused its efforts, including 19 projects in seven countries, in two directly threatened regions: Tropical Southeast Asia and Temperate Central Asia. Despite the magnitude of the ecological crisis, WCI is the only U.S. conservation organization with major research and training programs in these areas.

The *Southeast Asian* program is concerned primarily with the unique and extraordinarily diverse rain forests and mangrove forests of Borneo, Papua New Guinea, and Thailand. In February 1989, Regional Coordinator *Mary Pearl* led a meeting of WCI's staff scientists in Asia—*George Schaller*, *Alan Rabinowitz*, *Elizabeth Bennett*, and *Mark Leighton*—in which goals were set for dealing with commercial logging, forest fires, overpopulation, slash-and-burn agriculture, hunting and gathering, and other environmental threats over the next five years.

Bennett's research on mangrove ecosystems in *Sarawak*, *Malaysian Borneo*, culminated in reports to the government on the effects of logging in the peat swamp forests of *Maludam* and the conservation status of primates in *Malaysian reserves*. Her important research on *proboscis monkeys* will be carried on by *Ramesh Boonratana*, a Malaysian doctoral candidate, while *Bennett* tackles broader

surveys of forest wildlife in *Sarawak*. From *Gunung Palung*, deep within the rain forest of *West Kalimantan*, *Indonesian Borneo*, *Leighton* continues his five-year-old tropical ecology studies and training for Indonesian and American students.

In *Thailand*, *Rabinowitz* was completing his field research on tropical forest carnivores in *Huai Kha Khaeng Sanctuary*. He also helped coordinate and write a detailed management strategy for the *Tawu Mountain Nature Reserve* in *Taiwan*, which he had helped establish. The training of conservation biologists at *Bangkok's Mahidol University* continued under WCI Research Fellow *Warren Brockelman*, and *Sampod Srikosamatara* of *Thailand* entered his last year as a WCI/Noyes Foundation Fellow in Conservation, a program designed to launch young Third World biologists in conservation careers.

Through NYZS Ornithology Chairman *Donald Brunning*, support was provided to the Research and Conservation Foundation of *Papua New Guinea*, where WCI also sponsors research on birds of paradise and dwarf cassowaries.

WCI's program for *Temperate Central Asia*, under Director for Science *George Schaller*, scheduled projects on lion-tailed macaques in *India* and *Guizhou golden monkeys* in *China*, and continues *Dr. Schaller's* own long-term survey of wildlife in *Tibet* and *China*. He also participated in a sur-



Spectacled bears and other wildlife in Ecuador are threatened by gold mining activities.

for the rare conifer tree that grows there, and the only protected area in the southern part of the country. The biological importance of the park's cloud forests, situated along the eastern slopes of the Andes, is internationally recognized. The forests are home to such rare and endangered species as the mountain tapir, the spectacled bear, and the golden-plumed parakeet.

At present, between 1,000 and 2,000 people are mining for gold inside the boundaries of *Podocarpus National Park*. Most of the miners are subsistence farmers who have abandoned their land. Now, companies have begun to buy mining concessions from the government, which has designated a substantial area of the park as available for purchase. Mercury poisoning is common among the miners and beginning to affect downstream villagers. The impact of hunting and firewood gathering has not yet been identified.

WCI, along with several other international groups, has recently established a unique relationship with *Ecuadoran conservation organizations* and other local groups to help save *Podocarpus*. One strategy is a joint effort between



WCI and a particularly enthusiastic local group, the Andean Defenders of Nature, known as DANTA, to call public attention to the destruction of the park, and to the health hazards created by uncontrolled mining. WCI is also supporting research by Ecuadorian scientists on the status of wildlife within the park, and an analysis of the mercury levels in the park's streams.

The appeal of gold mining in developing countries will no doubt endure for a long time, but extinction is forever. WCI is undertaking efforts to ensure that the cloud forests remain intact and that wildlife survives beyond short-term monetary needs. Like all conservation groups, as Lisa Naughton notes, WCI "faces major political, economic, and social challenges in promoting conservation versus permanent destruction due to gold fever."

Javan Rhino Rediscovery

Evidence of the Javan rhinoceros, thought to have been extinct everywhere except on the island of Java, has turned up in Vietnam. WCI Director for Science Dr. George Schaller, together with Nguyen Yuang Dang, Le Din Thuy, and Vo Thanh Son of Vietnam, recently conducted a survey of Vietnam's southern forests. The remains of two Javan rhinos, along with rhino tracks and recent sightings by locals, led them to conclude that ten to fifteen Javan rhinos survive in the area.

The team has recommended that the boundaries of the Nam Cat Tien Reserve be extended to include the entire area in which the Javan rhino is now believed to exist. With funds from WCI, a working group under Professor Le Dien Duc will run a public awareness campaign in Vietnam about the rhino, and conduct further intensive surveys in Lamdong and Daklak provinces this year. ■

vey of wildlife in Vietnam's southern rain forests, where dramatic evidence of *Javan rhinos*, presumed extinct since the 1960s, was found (see story on page page 41).

WCI TRAINING AND EDUCATION

One of WCI's principal goals is to train and support conservation biologists and other professionals in their own countries, to strengthen the core of conservation leadership around the world into the next century. At year's end, nearly half of WCI's 113 projects were directed or co-directed by indigenous scientists, an enormous increase over previous years.

Most of WCI's projects have training components. In Venezuela, Stuart Strahl has worked with scores of students at Simon Bolivar University in Caracas. Warren Brockelman has done the same at Mahidol University in Bangkok, Thailand. Under

David Western, all the WCI projects in Kenya are run by fellow Kenyans. And in Central America, efforts under Archie Carr III to preserve the rain forests of the Greater Peten are based primarily on the field work of young scientists from the area.

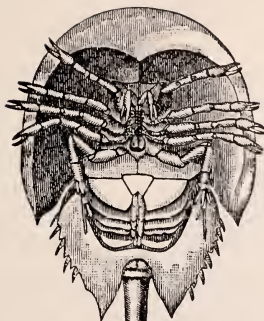
Of special note are funds that have been earmarked for training and support of this kind. A three-year grant of \$420,000 from the Pew Charitable Trust, made in 1987, supported training programs around the world. The Noyes Foundation was particularly helpful to student projects in tropical South America. And Noyes also offered fellowships for scientists returning to work in their own countries: Claudio Campagna in Argentina, John Kasenene in Uganda, Patricia Majluf in Peru, R.B.M. Senzota in Tanzania, and Sompod Sriko-samatara in Thailand.

WCI Research Zoologist Patricia Moelbman and an assistant in Tanzania.





ENVIRONMENTAL EDUCATION



he Bronx Zoo Education Department recently received a letter from Ms. Mary K. Spencer at Public School 16 in the Bronx. This letter could have come from Kentucky or

Texas, or even from Peru or Colombia. The Summer Seminar program is designed to train teachers who will in turn train other teachers in science and conservation biology, and in the innovative methods developed over the years by the Bronx Zoo education staff.

Multiplying The Conservation Message

"Thank you for the wonderful experience I recently had taking the Bronx Zoo Summer Seminar for Teachers....This seminar accomplished the tremendous task of helping us internalize an attitude that we now know to be so vital to ourselves, our students and to the world. We now feel a part of the Zoo and the focus on conservation of animals and their habitats is now our own. Thank you."

Annette Berkovits, Director of Education at the Bronx Zoo, explains that the program was created to address the Society's urgent conservation mission while maximizing the Bronx Zoo's education resources. "The Education Department has limited time, limited space, and limited staff. We sat back and tried to figure out a new approach before it became too late. Unless something is done

to speed up conservation action, all our efforts may be for naught. Teachers training teachers works."

Teachers training teachers is a means of rapidly multiplying the impact of the Bronx Zoo's education courses. Each teacher attends the seminar with the proviso that the principal or administrator will set aside time for the teacher to impart what he or she has learned to peers in the school or district. In fact, the administrators are often invited to the Zoo as well, so that they too will come to appreciate the urgency of the mission. The average high school biology teacher may teach not only 200 students during the school year, but 10 or 15 other teachers. Each of these teachers may in turn teach 200 students. Now the message is reaching 2,000 or 3,000 students through only one Zoo-trained teacher.

While the Zoo Education staff teaches thousands of schoolchildren each year, teaching teachers is even more effective. As adults, they are better prepared to understand the complex conservation message. "Most importantly," says Director Berkovits, "the program appeals to the natural inclination of teachers to think of themselves as agents for change. We convey knowledge to these teachers, but they also come to understand that their life sciences program must be a conservation biology program. They realize that an appreciation of the Zoo as a resource, that an understanding of conservation as the science of the future, puts them one



BRONX ZOO EDUCATION

In programs established over the past three years, the Bronx Zoo has become the prime mover—locally, nationally, and internationally—in training teachers how to use zoos in science education (see story on page 43). Stressing the importance of ecological and wildlife conservation, twelve programs trained 1,397 teachers at various levels in Bronx Zoo seminars during the past year alone.

In the 1989 Saturday sessions of *Zoos for Effective Science Teaching (ZEST)*, a 45-hour course funded by the National Science Foundation for high school and middle school teachers, participants from throughout the New York area, assisted by Bronx Zoo instructors, developed their own zoo teaching units on topics such as animal adaptation, evolution, wildlife habitats, and endangered species. Some units will be incorporated in a comprehensive ZEST Teachers Manual to be distributed on request to all science supervisors in the tri-state area.

Expanding Horizons, a new series of six Saturday sessions for elementary school teachers begun in the spring semester and funded by the Aaron Diamond Foundation, introduces methods for combining wildlife studies with language arts, social studies, mathematics, and other subjects. Like ZEST, *Expanding Horizons* requires that participants pass their knowledge on

to fellow teachers, thus multiplying the seminars' effect.

Nationally, the Zoo Education staff conducted teacher workshops at several school science conferences. They also traveled to Seattle, Washington; Richmond, Virginia; Kansas City, Missouri; Chicago, Illinois; Little Rock, Arkansas, and elsewhere to conduct training seminars for *Survival Strategies*, the second module of *Wildlife Inquiry Through Zoo Education (WIZE)*, which is being disseminated to junior high schools and high schools throughout the country with the aid of a grant from the U.S. Department of Education.

Internationally, the de-

step ahead of their textbooks. After this seminar they know they can be on the cutting edge and making a difference."

In addition, the program treats teachers as professionals and invites them to share their expertise, with their peers and with others. They are encouraged to participate in writing lesson plans and in making presentations at professional conferences. Some have even appeared on local radio shows.

Today the Education Department's programs put the spotlight on the Zoo as a center of learning and science. Teachers are coming to un-

Teachers attending ZEST and other seminars get an inside view of animal management and conservation programs.





derstand that Zoo breeding programs, exhibits, and scientific research can be part of an all-encompassing approach to conservation biology. They have been imbued with a contemporary body of science knowledge, as well as new approaches to teaching. And as each teacher trains other teachers, more and more children will gain a foothold in the life sciences, and an understanding of the urgent need to prevent environmental disaster.

Success Stories Of The Young And Inspired

Hands-on experience. This is the goal of Christopher Columbus High School's after-school occupational skills program. As explained by Assistant Principal Liborio J. LaMagna, "it is designed to give young people an opportunity to work in different fields and in different locations, so they can make real judgments, positive or negative, about the future." One of the most successful manifestations of the program is the Animal Care and Management Program conducted jointly by Columbus High and the Bronx Zoo's Education Department.

The Zoo curriculum consists of sessions on invertebrate biology, animal care and management in a zoo setting, animal health, endangered species, conservation, and animal-related careers ranging from veterinary science to animal exhibit design. Zoo instructor Tom Alworth says, "the kids are genuinely interested in animals, and they think it's great fun to come to the Zoo. But it's a little bit of a surprise for them to find out that animal work isn't all glamour. There's a lot of responsibility. The animals have to be fed and cared for every single day with no excuses."

Perhaps most significant, remarks Alworth, is that "the kids are not aware of some of the career choices they may have. This course gets them excited about career possibilities." He tells of



Feeding the animals is part of a Zoo Camper's day.

partment is planning, with Wildlife Conservation International, a pan-American congress on wildlife conservation through education. The congress, to be jointly sponsored by NYZS, the International Association of Zoo Educators (IZE), and the Venezuelan government, is scheduled for Caracas in January 1990.

To increase the coherence, enjoyment, and educational value of a visit to the Bronx Zoo, four thematic *self-guided tours* have been developed for testing in summer 1989. The printed materials, with detailed information about animals and conservation, describe routes through the Zoo for children ("Fuzzy, Furry Mammals"), families ("Animal Families" and "American Wildlife"), and adults ("Endangered Species").

A total of 4,476 adults and children attended *general audience classes*

at the Zoo. Among the guest lectures were many by NYZS field and Zoo scientists, including George Schaller on his recent wildlife surveys of Vietnam, Alan Rabinowitz on jaguar conservation in Belize, Amy Vedder on the gorillas of Rwanda, veterinarian Robert Cook on aquarium medicine, and Christine Sheppard, Dan Wharton, and William Holmstrom on studbook keeping for endangered species. New children's programs such as "Daddy and Me and the Zoo Makes Three" and "Pablo Python Looks at Animals" are already among the Zoo's most popular programs.

Due to increasing demand, *school courses* are now booked more than a year in advance, with 33,047 students in grades K-12 attending last year. An additional 16,650 students were served by the tour program run by the Friends of the Zoo, and 395,618 students came to the Zoo in organized school groups. The first *School Services Catalog* was issued to help tri-



state area teachers plan class participation in Bronx Zoo classes.

Some 350 gifted students from Bronx and Manhattan junior high schools enrolled in *Jungle Research and Exploration*, funded by the New York State Council on the Arts. This introduction to field research and life sciences is part of an effort to encourage minority applications to the City's special science high schools. *Animal Care and Management*, a thirteen-session, after-school course, was attended by juniors and seniors from Columbus High School in the Bronx, who achieved nearly perfect attendance (see page 45). The major program for K-2, *Pablo*

Python Looks at Animals, reached 63 classes from citywide schools with its recently published books and cassette on animal sizes, shapes, textures, patterns, sounds, locomotion, and feeding behavior.

The department's animal facilities, the *Children's Zoo* and the *Camel Rides* in Wild Asia Plaza, drew 547,698 and 75,469 visitors, respectively. A new alligator exhibit, with underwater viewing, was added in the Locomotion area of the Children's Zoo, and improvements were made in the Locomotion, Defenses, and Marsh areas. Children's Zoo and Education Department staff developed new guidelines for handling animals in classrooms which will be published in a booklet for teachers next year.

In addition to its everyday classroom and special events activities, the au-

one young man who pulled him aside after a session on ethology, or animal behavior. He had never heard of it before and was extremely excited about the prospect of becoming an animal behaviorist. When he asked about universities that have such programs, he was given the names of people to contact.

The course is thirteen weeks long and enjoys nearly perfect attendance, despite the fact that it takes place after school hours, at the Zoo, at some distance from the school, with the students responsible for their own transportation. Julissa Brenes is sixteen years old and has a full-time summer job in the Guest Services Department of the Zoo. She says, "I never touched a live animal except a dog or a cat before. Here I held a boa constrictor and felt how tight it gets when it wraps around you." She thinks many of her fellow students will become veterinarians, though she might become an obstetrician-gynecologist. In any case, she feels the Zoo course has been instrumental in preparing her for college-level science courses and has already recommended it to incoming freshmen.

Doug Unis is already in college. He is a junior at Duke University. Doug did not attend the Columbus High program but participated in many of the Zoo's school and camp programs as he was growing up. Now he is a summer intern instructor at Zoo Camp. He remembers his days as a Zoo camper, when the instructors would bring out the parrots or the monitor lizards and his excitement would build as each camper got to touch these exotic animals. He can see now that coming to camp at the Zoo is having the same effect on kids today as it did when he was small. "It made me feel strongly about the environment," he says. "This summer's Zoo camp kids are buying litmus paper

Instructor Suzanne Daley introduces students from P.S. 205 in the Bronx to animals in the Children's Zoo.





The Animal Care and Management Program gives students from Columbus High School a new perspective on life after the classroom.

and testing local streams and ponds for acid rain. They appreciate that there really is something we can all do. They don't quite understand yet why anyone would burn down a rain forest, but they know it's not right. They're aware of the the problems, and they'll be conscious of conservation issues as they grow up."

Of Whales And Horseshoe Crabs And An Education In Marine Sciences

At Junior High School 50 there are two boys who are known for their hostility and anger, for their continuous arguing, and for calling each other names. They accuse each other of wild and crazy deeds and malign each other's families. Much of the time they stop just short of an actual fistfight. One afternoon they were part of a group at the New York Aquarium watching the beluga whales

dio-visual staff produced a half-hour videotape—"ZEST: A Renaissance in Science Teaching"—for distribution to zoos, museums, and school administrators, and a ten-minute tape to encourage the dissemination of *Survival Strategies*. For other departments they produced and installed videos in the Central Park Zoo and the new Zoo Center, created a closed-circuit insider's view of leaf-cutter ants at the Central Park Zoo, and produced the Annual Members' Meeting. Their film for the 1988 Annual Meeting on Wildlife Conservation International received special merit awards at the 13th Annual Wildlife Film Festival in Missoula, Montana.

Friends of the Zoo, who were honored at the 1989 Annual Meeting, also helped in the Ornithology Department's hornbill mating project and the Animal Health Center's vitamin assays. FOZ volunteers developed and introduced "biofact carts" to provide visitors with information about animals and their environments. The 197 members of FOZ gave tours of the Zoo to 18,475 children and adults, reached 2,655 people in hospitals and nursing homes, and worked 6,000 hours interpreting exhibits in the Children's Zoo. □

AQUARIUM EDUCATION

Classes, seminars, and tours for the general public and for students from kindergarten through college enrolled 28,010 par-

ticipants in 940 sessions during the year. Titles ranged from "Animal Adaptations" to "Behind-the-Scenes at the Aquarium." Beneath Noah's Ark, the series of weekend classes for every age level, attracted 1,879 people, and workshops in using the Aquarium were attended by 435 teachers.

Based on concepts developed by the Education Department, the George D. Ruggieri, S.J. *Discovery Core* will enhance marine science programs at the Aquarium and serve as new headquarters for the department. Texts for the graphics in the new complex and for the brief videos on aquatic adaptations and other subjects were developed by the education staff. Prototypes for interactive exhibits designed for toddlers were tested by parents and children attending the infant-toddler program. The creation of curriculum materials is underway with the help of six educators from the New York State Marine Educators Association.

Strengthening links with neighboring *Kingsborough Community College's Marine Education Program* was a program hosted by the Education Department for science chairpersons. This was part of the NYC Board of Education's Program for Professional Development and Leadership Training. Another Kingsborough connection involved training by Senior Instructor *Merryl Kafka* of 55 students from five different high schools in preparation for their entrance



into the new two-year associate degree program in fisheries and marine technology at the college.

Former Curator *Dr. Erwin Ernst* was named director and *Ellie Fries* assistant director of education. Two instructors, *Arlene de Strulle* and *Melissa Haggart*, joined the teaching staff. Ms. Fries and Ms. Kafka were given the Kingham Service Award by the New York State Museum Educators Association for outstanding contributions to the organization.

CENTRAL PARK ZOO EDUCATION

The *Heckscher Zoo School* opened on March 9, 1989, and began a full schedule of classes, including nine courses for children, adults, families, and school groups as well as lunch-time lectures. From "Seals and Sea Lions" to "Tropical Rain Forests—Paradise in Peril" the subjects concerned animals and habitats represented in the Zoo.

More than 70,000 schoolchildren visiting the Zoo in organized groups used the Education Department's self-guided tour. A package titled "From the Zoo to You," including ten animal fact sheets and booklets describing the Zoo's temperate, tropical, and polar zones, is being produced with funding from the Samuel and May Rudin Foundation.

After eleven weeks of training by animal and education staff, 55 volunteers have become *Zoo-Guides*, assigned to



providing information to visitors in the Wildlife Conservation Center and at "Education a la Cart," the Zoo's mobile education center.

PUBLICATIONS

The January/February 1989 issue of *Animal Kingdom* introduced a new cover line, "Dedicated to Wildlife Conservation," and along with it a change in editorial focus. By the May/June issue, several new departments were established, including "Conservation Hotline," "Earth Monitor," and "Elephant Watch," all based on reports from field scientists around the world, many of them representing Wildlife Conservation International.

Feature articles are now also more specifically concerned with *endangered species and conservation*. Most are accompanied by information about the survival status of various species, recommended fur-

Events like cleaning the beluga whale's windows make a class visit to the Aquarium even more exciting.

peacefully swimming from one end of the tank to the other. As usual, the boys were embroiled in a heated exchange that called for adult intervention. The instructor approached, expecting to find them insulting or threatening each other. Instead he found them arguing over the type of filtration system used in the tank, whether it was a biological system or not, and whether it contained microbes.

In the Williamsburg section of Brooklyn, near Junior High School 50, many people are hardened to an inner-city life filled with crime and drugs and poverty. In this environment most teachers find it difficult to reach young teenagers with seemingly irrelevant lessons on atoms and molecules or evolution. Not John Lucania. One day he asked his science class if anyone kept fish. Surprisingly, a few hands went up, and a discussion about aquatic animals ensued. Hoping to capitalize on this spark, Lucania approached the New York



Aquarium about incorporating marine sciences into his curriculum. Now, having worked for several years with Aquarium instructors Merryl Kafka and Robert Cummings, Lucania teaches the most popular and successful classes in the school. His students have been captured by that indescribable desire to learn. Some even suggest that this troubled junior high has remained viable due in large part to its joint program with the Aquarium.

One school official thanked the Aquarium for providing a certain student with a summer job opportunity. It kept him out of jail, the official said. Instead of buying drugs, or even candy or comic books, with the little bit of money these children have, some buy goldfish and guppies to put into the fish tanks at school.

Assistant Director of Education Ellie Fries says she is, "extremely proud to be part of a program that has helped turn kids around from the destruction they experience every day. It would be great if they remembered how many parts per million of oxygen is found in water. But what's really important is that we've inspired a genuine interest in science and conservation. These kids now have a reverence for life they can't learn on the streets. We've changed their attitudes and we have even changed their behavior."

At the end of the year, the class takes a field trip out to a marsh. Last year the class found two boys abusing a horseshoe crab, banging on its shell, cracking it. Before the instructors could even urge caution, the class confronted and surrounded the boys, and proceeded to deliver a lecture on conservation. After chasing the offenders away, the crab was gently placed back in the water, in the hope that it would recover and again take up its rightful place in the wild. ■

ther reading, and suggestions about how the reader can help. Subjects have included the "Treasures of Mexico," the conservation of macaws in Peru, the use of chimpanzees in AIDS research, Alaska's threatened fur seals, and "African Destiny," which took up the entire May/June 1989 issue with articles on elephants, rhinos, mountain gorillas, and innovative approaches to conservation.

Also planned are columns devoted to ecological viewpoints and an even broader coverage of ecological news, with added attention to scientific discoveries, the zoo world, grassroots conservation efforts, and an international list of key people to contact in support of conservation.

Since the fall, all visitors to the Bronx Zoo have received a new, free publication, *The Bronx Zoo's Paper*, which is updated and published three times a year. In addition to a Zoo map and directory, the colorful,

four-page paper contains Zoo news, information, and quizzes to enhance the visitor's enjoyment and ecological awareness.

The Society's 200,000 color and black and white photographs, dating back to 1897 are being catalogued in a computer program that will provide access to the entire collection by staff and outside researchers. During the year, more than 1,500 color slides were supplied by *Photo Services* to staff members for use in lectures, fund-raising, exhibit planning, art reference, publications, and educational programs. Among them were new photos of the Central Park Zoo, exhibition construction underway at the Bronx Zoo and New York Aquarium, protein-analysis procedures, and the newly hatched red birds of paradise. □

Almost everyone at Zoo Mask Weekend read the new Bronx Zoo's Paper.





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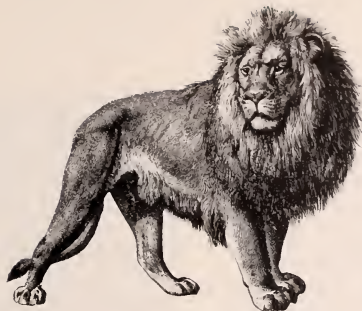
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SUPPORT SERVICES



he caterer has recommended a mustard vinaigrette for the tri-color salad, the red parrot cannot be on hand for the cocktail hour, the floral arrangements are too tall, the fans for the tent must be in place at least two hours in advance, a staff member must accompany the bus. Three of the tables for ten must be set for eleven and four must be set for nine, the lights in the Tropic Zone must be on so that the animals will be active at dusk, and the printer is late with the programs.

Behind The Scenes In Public Affairs

Behind the scenes in the Public Affairs Department there is no shortage of experienced party-givers. The logistical details of organizing a dinner-dance for 200 people would undo many a corporate executive, but here the staff takes it all in stride. Fund-raising is, of course, an important activity for any not-for-profit organization, but the park environment and the animals make fund-raising events a particular challenge. At a museum such events take place indoors. Here they are vulnerable to the whims of nature.

"During the cold winter months," explains Director of Public Affairs James W. Meeuwssen, "the Public Affairs people devote exclusive attention to the important fund-raising work on which the Society depends." They might raise half

a million dollars for a new coral reef exhibit at the Aquarium or \$100,000 for the rhino sculptures in the garden at the new Keith W. Johnson Zoo Center. Foundations and individuals with an interest in animals and conservation are identified, and CEOs and company presidents are courted.

Director of Development Candice K. Hanley points out that, "in order to be successful, the fund-raising staff has to keep up with scientific developments, both here at the Zoo and on the international scene." Donors constantly inquire about the latest news in the rare animal breeding programs or the dwindling population of elephants and other endangered species.

When warm weather comes, though, the festivities begin. Director Hanley supervises a whirlwind of activity that includes designing invitations, writing up menus, doling out staff assignments, arranging seating plans, and seeing that staff as well as guests are fed. Once the party gets under way, there are hair-raising tales of the speaker who showed up without his glasses and the electric carts that ran out of juice, and the famous shortage of salad plates.

In addition to celebrating new exhibits and thanking donors, the opening of the new Central Park Zoo has created new fund-raising options. The new Zoo is located in midtown Manhattan, and offers an exotic setting against a great view of



PUBLIC AFFAIRS

Major themes and events were prominent in the activities of development, membership, public relations, advertising, and marketing. Among them were completion of the Keith W. Johnson Zoo Center, Discovery Cove, and the John Pierpont Wildfowl Marsh; the Rhino Rescue Fund and African Elephant Alert; and long-range planning for the Society's capital needs.

Capital, operating, and endowment funds raised by the department totaled \$13,413,869. Included were contributions, dues, and bequests from 172 foundations, 187 corporations, and more than 60,000 individuals. The Guest Services program managed ten corporate parties and 85 other meetings, receptions, lunches, dinners, and tours in the Society's three New York facilities.

Capital funds totaling \$1,891,615 were distinguished by three outstand-

ing gifts for Discovery Cove—from the Society's Women's Committee, Trustee Edith McBean, and The Horace W. Goldsmith Foundation—and one for Zoo Center from Eleanor Avery Hempstead. The 1988 disbursement from the Lila Acheson Wallace Fund for the New York Zoological Society provided financing to initiate updating of the World of Birds, a Nursery and Browse Center at the Bronx Zoo, a greenhouse to supply the City Zoos, and several enhancements at the Central Park Zoo.

Operating funds totaled \$6,324,340. Bequests from the estates of Margaret W. Carter, Dora A. Dennis, Emily D. Isbell, and seven others came to \$3,273,958, and funds in planned giving instruments that will eventually accrue to the Society totaled \$2,592,250, including an annuity trust of \$2,401,949 and the first contributions to the Society's Pooled Income Fund from Trustee John Elliott, Jr., and Honorary Trustee Robert Blum.

Individual donors gave \$1,465,870, with \$590,000 from the 364 members who contributed \$1,000 each as Annual Patrons. With the creation of the Animal Kingdom Club, 15 donors became Best Friends (cumulative total of \$1 million or more) and 20 became Benefactors (between \$250,000 and \$999,999); 29 joined the Presidents' Circle (annual gift over \$25,000), 30 the Director's Circle (\$10,000-\$24,999), and 46 the Curator's Circle (\$5,000-\$9,999). Notable gifts were received for general oper-



The calm after the storm—another successful Corporate Benefit begins around the Sea Lion Pool in the Central Park Zoo on June 22, 1989.

Aquarium Director Louis Garibaldi and Collections Manager Paul Sieswerda discuss finishing touches on Discovery Cove.



the city skyline. This has attracted the attention of major corporations, law firms, and other organizations continually seeking a location for special events. Jill Alcott, Manager of Special Events at the Central Park Zoo, says, "It also sometimes attracts rather bizarre or unworkable requests."

However, Alcott explains, "We have to be careful that the events don't conflict with the Society's conservation goals and that we don't just become a backdrop for gimmicky public relations campaigns." Law firms giving parties for summer associates has become routine this year. And the



Disney Corporation is expected to have an event that will include a light show and some Disney characters. The Central Park Zoo's guidelines, of course, reflect the Society's policy in general of maintaining a certain decorum that includes respecting the animals and their habitats.

Of utmost importance, these occasions are an opportunity to bring powerful decision-makers from the worlds of business and politics into contact with wild creatures and with the New York Zoological Society, to build a constituency for wildlife in high places. They are a chance to make sure that the Society's supporters know they are appreciated and to have some fun, while saying thank you to those who have donated both time and money.

ating purposes from Louise B. and Edgar M. Cullman and for Animal Health programs from Mrs. L. Emery Katzenbach.

Corporations gave \$1,182,824, aided by the Business Committee, its chairman, Marshall Manley, and major contributions from The Bristol-Myers Co. Fund, The Chase Manhattan Bank, Citicorp/Citibank, Consolidated Edison Co. of N.Y., Inc., Coca-Cola USA, Exxon Corporation, The Hoffmann-La Roche Foundation, Liz Claiborne, Inc., Merrill Lynch & Co., Inc., The New York Times Company Foundation, Inc., and The Ogilvy Foundation. The *Corporate Benefit* on June 22, 1989 at the Central Park Zoo, co-chaired by Robert V. Hatcher, Jr., Chairman of Johnson and Higgins, and Maurice R. Greenberg, Chairman, President, and CEO of American International Group, Inc., raised \$300,000 and presented the Society's Disting-

uished Leadership Award to Marshall Manley.

Private foundations contributed \$1,488,906 in budgetary funds. Significant support came from the Edward John Noble Foundation for the Wildlife Survival Center on St. Catherines Island; the Louis Calder and Aaron Diamond foundations for education programs; the Bailey Research Trust, Charles A. Dana Foundation, and F.M. Kirby Foundation for Animal Health; The Bay Foundation for a field veterinary program; and The Norcross Wildlife Foundation for horticultural projects. A special gift from the Samuel and May Rudin Foundation made possible the acquisition of a baby elephant for the new Zoo Center.

Aquarium and Osborn Laboratories funding totaled \$130,268, with special gifts from the South Branch Foundation, The Perkin Fund, and Trustees Edith McBean and Dr. Henry Clay Frick II.

Contributions to *Wildlife Conservation International* rose 38 percent to \$2,717,673. Prominent

Ruffed lemurs enjoy their freedom on St. Catherines Island, but are monitored closely.





among them were a three-year \$1-million grant from the John D. and Catherine T. MacArthur Foundation for rain-forest conservation and continuing support from the Pew Charitable Trusts for training components of WCI worldwide.

WCI projects in *Africa* received major support from Liz Claiborne and Art Ortenberg for elephant conservation in Kenya and Tanzania, the U.S. Agency for International Development for long-term conservation in Rwanda's Nyungwe Forest and Cameroon's Korup National Park, the Muskwinni Foundation for Dr. Patricia Mochlman's work on jackals in Tanzania, and the Robert Wood Johnson, Jr. Charitable Trust for Terese and John Hart's okapi research in Zaire. For *Latin America*, the Jessie Smith Noyes Foundation completed its grant for field training, the Tortuga Foundation renewed support for Dee Boersma's penguin work in Argentina, and the Frank Weeden Foundation backed a project to explore a debt-for-nature swap.

Successful WCI direct-mail campaigns were conducted in behalf of the Rhino Rescue Fund, the Elephant Action Plan (see page 35), and tropical rain forests. There are now 95 Friends of WCI, donors of \$2,500 or more, and 37 William Beebe Fellows, at \$10,000 each.

Membership stood at 33,500, with members providing \$1,938,066 in dues and fees, \$145,000 for general operating ex-

penses through direct mail, and \$46,000 in corporate matching gifts. Special members' events included garden parties, members' evenings, previews of the new Zoo Center and Discovery Cove, cleanup days at the Bronx Zoo, Central Park Zoo, and Aquarium (see page 56), and sail on the sloop *Clearwater*. At the Society's 93d Annual Meeting at Avery Fisher Hall, 5,000 members and guests attended a varied program that featured WCI field biologist Elizabeth Bennett's work on the proboscis monkey in Borneo and a salute to Friends of the Zoo.

Some major stories marked the department's *Public Relations, Advertising, and Marketing* program. Newspapers, magazines, television, and radio gave extensive coverage to the opening of the Central Park Zoo, with CBS broadcasting its evening news live from the Zoo. Several magazines, including *Parade*, *Town and Country*, and *Modern Maturity* ranked the Bronx Zoo first among the nation's zoos, and *Family Circle* highlighted the Aquarium in an article on America's best aquariums. Nationwide articles recognized WCI's leadership in efforts to save black rhinos and African elephants. Special press luncheons at the Central Park Zoo provided an important forum for WCI's George Schaller and David Western to report on their conservation work in the



The ancient art of sowing is practiced with enthusiasm by younger NYZS members at Members' Cleanup.

Members' Cleanup: On The Inside Looking Out

This year's torrential rains aside, spring is always the same at the Zoos and the Aquarium. Babies are being born, the weather is getting warmer, and the exhibits must be readied for visitors to view the animals in their outdoor habitats. It's time for Members' Cleanup.

The project first started in 1977 when construction in the Bronx Zoo's newly created Wild Asia exhibit continued up to the last moment before opening. Faced with heaps of construction debris, soda cans, stray papers, bits of wire, and other odds and ends, the question arose as to how to engineer a massive cleanup in a big hurry. "The answer," explains Membership Manager Allegra Hamer, "was to call on the Zoo's friends to donate their time to help make the Zoo look its best." Not only did they help. They had a great time. And the members themselves suggested that it should be a yearly event.



Eventually, cleanups were instituted at the Aquarium and, last year, at the new Central Park Zoo.

So each spring Hamer invites the members of the Society to participate in Members' Cleanup at all three places. Some people return year after year, requesting the same favorite job of painting or planting or spreading mulch. Some even bring their own tools. For those who don't, gloves and rakes and hoes and such are provided. People bring along their friends and children, are assigned to a staff member and are sent off for a few hours to find out what it takes to get a zoo ready for the high season.

Thirteen years after its inception, the Society has come to rely on the contribution made by Members' Cleanup. At the Bronx Zoo, for instance, one yearly job is cleaning out the Flamingo Pond and building mud nests for the birds. In the wild flamingos perform this task themselves, but in captivity they are sometimes in need of human assistance. And they get it, from members happy to slosh around and shovel mud into mounds on which flamingos can lay eggs.

The dedication and hard work are very much appreciated by keepers and maintenance staff, who direct the volunteer groups. At a Zoo duck pond the crew raking leaves is especially careful not to disturb eggs laid under the bushes. And the sheer determination with which a skinny eleven-year-old girl wrestles wheelbarrows full of mulch would impress anyone. This year one group spent hours on hands and knees planting special grass plugs on the elephant side of the new Zoo Center. The grass is an especially hardy variety with long roots intended to withstand the pressures of five-ton elephants walking on it and pulling at it with their trunks.

field. In Washington, at a joint press conference held by WCI and World Wildlife Fund, the devastating results of an ivory trade study were announced. Four days later, President Bush declared a complete ban on ivory imports into the United States.

Colorful new advertising on television and radio, in newspapers, magazines, and subways focused on the Bronx Zoo as a "Celebration of Life" and urged viewers and readers to "Discover the New York Aquarium," the latter leading up to the opening of Discovery Cove. WCI television spots were produced on the elephant ivory ban, and another WCI print campaign focused on snow leopards.

Promotional events included "Zoo Mask Weekend" on May 20 and 21, celebrating big cats at the Bronx Zoo with a variety of performances and participatory family activities, and the benefit for humpback whales aboard

the American Hawaii Cruises' *S.S. Independence* on March 30.

The new marketing program began to emerge with several attendance promotions conducted jointly between the Bronx Zoo, the New York Aquarium, and several corporations, including Perrier (Great Bear), Southern New England Telephone, and the Coca-Cola Bottling Company of New York. A comprehensive market survey of the demographics, habits, and satisfaction levels of Bronx Zoo guests was begun, and a licensing consultant was contracted to assist the Society's marketing effort. Better ways to serve and reach the Society's diverse audiences will be explored by a Marketing Committee recently established in cooperation with the Guest Services Department. ■

Sabar Ak Ru Afriq Dance Theater performed at Zoo Mask Weekend honoring the big cats of the Bronx Zoo.





The new "Celebration of Life" ads were seen on taxi tops and billboards throughout the City, thanks to Philip Morris Companies Inc.

OPERATIONS— CONSTRUCTION AND MAINTENANCE

Under the supervision of the Exhibition and Graphic Arts and the Operations departments, the outdoor forest habitats for Indian elephants, rhinos, and tigers, and the public entrance gardens of the Keith W. Johnson Zoo Center neared completion. The complex was to reopen on July 19 (see story on page 11). FGI, Inc. did much of the exterior construction work while Cemrock, Inc. fabricated mudbanks, boulders, and rock formations for the joint City- and Society-financed project.

Work on the John Pierpont Wildfowl Marsh was completed in early spring by the Thalle Construction Company, under City contract (see page 20). Entirely relandscaped as a northeastern marsh pond, and outfitted with a

new water recirculation system, the exhibition reopened on May 7.

Thalle also worked on the City-funded part of the African Highlands project, transforming the old Mountain Sheep Hill into a rugged Ethiopian plateau with a hidden animal management structure for gelada baboons, hyrax, and ibex. The Society-funded Plaza area, with its VeldtLab classroom, two visitor service buildings, and other public amenities in the style of a West African village, is scheduled to be completed in spring 1990.

With all major equipment for the Cogeneration and District Heating System in place, the final connections for the testing of hot-water and electrical distribution systems were about to begin. Full operation is expected in early 1990. However, serious problems with one contractor's performance threaten the project's completion.

Smaller City-funded projects included the extension of a water main to improve water pressure in

Most years the members get some sort of bonus for all their time and effort. One year the Bronx Zoo cleanup crews got to see the new baby rhino, Ella, before she was placed on exhibit. This year they got an advance look at the new Keith W. Johnson Zoo Center, which did not open until three months later. Members also get a poster or a T-shirt. One special aspect, says event coordinator Hamer, is that, "members get to see what it's like on the inside looking out, working where the animals usually are." The animals are kept inside for safety, but for once the regular visitors to the Zoo get to see the participants in Members' Cleanup inside the enclosures.

How To Succeed In A Season At The Zoo

Every year about 750 people, mostly young people, but also a few retirees and other adults, work at the Bronx Zoo for six months or so, from April to October, doing all the highly visible jobs that make a zoo run smoothly. These are the fast-food cooks, the tractor train drivers, the cotton candy vendors, the monorail guides, the ticket takers, and the souvenir sales people. They are mostly from the local community in the Bronx, which means they are mostly inner-city, minority, disadvantaged, and without great opportunity. All of them take part in the Personnel Department's Seasonal Training and Employment Program.

Charles Vasser, the department's resource specialist, says, "the Zoo's program is a chance for these young people to work and earn money, but it's much more than that. They are trained in how to be a good employee. If they do well, we pretty much guarantee them a job next summer. That's job security, financial stability, something in short supply around here. This young



person doesn't have to scramble every year to put money in his or her pocket or to make a contribution to the family income. And even if they don't come back, they've learned an awful lot of very transferable skills."

The program starts with recruitment at local schools and community centers. Since the Zoo is the largest summer employer in the Bronx, its ties are strong. Once hired, the new employees get orientation in such things as courtesy, cleanliness, and handling cash. One important lesson is about stealing. For instance, if a cook were to give his mother a free burger, that's like giving away \$2.00. If every one of, say, 300 employees would give away a \$2.00 burger, that could be \$600 a week. In a 26-week season, that's more than \$15,000. And even if nobody meant to steal it exactly, it's diverting funds from the important work the Zoo does. Orientation includes an insider's look at the work

the World of Birds, Propagation I, and the Crane-rearing Yards; repaving of the Crotona and Asia parking lots; a new roof and public flooring for the World of Birds; and a new roof for the Carter Giraffe Building.

The Society funded repair of the Cope Lake drainage system; Zoo Bar renovation; replacement of the World of Birds cooling tower; creation of a new apartment for visiting WCI field scientists; new roofs for service buildings and comfort stations; and a new area for blood pheasants in the Pheasant Aviary. A less obtrusive trash pick-

up scooter was put in service by the Maintenance Division.

Major projects being planned are rehabilitation of the Elk Range and sections of African Plains, now scheduled for bidding; relocation of the Service Center to the Zoo's perimeter (to be considered in a City-funded feasibility study); and re-use of the old Bird House as an Administration and Public Affairs office building.

ADMINISTRATIVE SERVICES

Formerly known as Visitor Services, the department responsible for *Admissions, Parking, Transportation, and Group Sales* as well as *Restaurants and Merchandise* was renamed *Guest Services* to reflect a more active concern for the comfort and convenience of people visiting the Bronx Zoo.

With record rainfall during the spring and the burgeoning of construction around the Zoo, attendance actually fell during the fiscal year by sixteen percent to 1,960,231. Aquarium attendance, which had grown at record rates over the previous six years, dropped nine percent to 710,165. The newly opened Zoo Center, Discovery Cove, and other exhibition facilities are expected to boost attendance figures above previous levels.

People using *transportation* systems within the Bronx Zoo—the Bengali Express, the Safari Tour Trains, and the Skyfari—

Seasonal employees at refreshment stands and other Zoo facilities take part in the new Training and Employment Program.





Visitors of all ages appreciate the quiet vistas of the new John Pierrepont Wildfowl Marsh.

totaled 1,375,897. Jungle World was visited by more than 585,000 guests. More people came to the Zoo than ever before in groups, as new markets were targeted through such programs as the New York State Travel and Vacation Association, Seaway Trails, the New York State Department of Economics, and the New York State Convention Visitor Bureau.

Restaurant improvements included the off-season renovation of the Zoo Terrace Restaurant, where a much wider variety of sandwiches and other foods were introduced during the spring. Frozen bananas and frozen fruit ices were added to the items available from the Zoo's 25 mobile carts. In-house catering increased, with service to 20 events sponsored by

Public Affairs and other departments.

Guest Services is the Department for which most of the young seasonal employees at the Bronx Zoo, Aquarium, and Central Park Zoo work. All of them (more than 700 last year) took part in the *Personnel Department's Seasonal Training and Employment Program (STEP)*, one of the few programs in New York City that teaches workplace behavior in connection with actual jobs (see page 58). STEP is designed to reach employees as young as fourteen years old.

Personnel considered more than 4,000 applicants from 48 states and 21 foreign countries for full-time jobs during the year, conducting nearly 700 interviews. The Society's full-time staff rose to 605 employees, with most of the growth attributable to the opening of the Central Park Zoo. ■

done by keepers and curators and an overview of the Society's endeavors to save animals and their habitats.

"These are lessons that cannot be learned in school," says Vasser, "even if schools would teach these practical things, which they don't. This is in-service training. We show them how to do things right, and then they go out and do it." The program is designed to cultivate a good employee in an area where there is something of a shortage. In addition to providing an earning and learning opportunity, the Zoo makes the program fun by creating incentives to excel. The various departments give awards for perfect attendance and other outstanding achievements, and each department selects an employee of the month. By the end of the season, about 50 winners attend a Broadway show, with a guest, and dinner and transportation included. Another bonus is employee appreciation day, when roles are reversed. The supervisors host a party and the seasonal people are the guests. On this day it's the supervisors who serve up the burgers, pour the sodas, smile, and say thank-you very much.

The program doesn't come to a close when the season ends. All employees get a letter mailed to their homes, thanking them for their service. This provides an opportunity for family recognition and also serves to reinforce the idea that a good employee is someone valuable to the Zoo. Outstanding employees get a certificate instead of a letter. This year 188 seasonal people are returnees from last summer. Some of them will go on to become full-time employees, like the seasonal employee who is now an assistant curator, or the tractor train driver who now holds a management job in admissions. ■

Disaster struck during the fiscal year ended June 30, 1989, as revenues for general operating purposes fell short of expenditures by \$1,534,199. Record rains in May and June, months which traditionally account for 30 percent of Bronx Zoo and New York Aquarium attendance, precluded the realization of revenue goals which had appeared to be within reach, as 135,000 fewer people visited the Zoo and Aquarium during those two months.

General Operating Support And Revenue

Private contributions from individuals, foundations, and corporations and revenue from fund-raising events increased 22 percent over fiscal 1988 to \$4,968,883. Bequests provided an additional \$3.3 million, of which \$2.5 million represented the final distribution from the estate of Margaret W. Carter. Together, the bequests of Margaret and James Walter Carter to endow Society programs totaled \$17.6 million!

Government support from all City, State, and Federal sources increased 16 percent to \$13,777,111. The City of New York, through the Department of Cultural Affairs, provided basic operating support of \$8,772,177 to the Bronx Zoo and the New York Aquarium. The City's Department of Parks and Recreation provided \$2,470,447 for the Central Park Zoo, reopened under Society management in August 1988.

The State of New York, through the Natural Heritage Trust of the NYS Department of Parks and Recreation, provided \$2,126,600 for the Zoo and the Aquarium. Additional State funding for Zoo Education came from the Council on the Arts (\$13,575) and the Education Department (\$6,404).

Federal funding totaled \$387,908, including \$129,617 from the National Science Foundation for education programs, \$125,376 from the Agency for International Development for Wildlife Conservation International projects in Africa, \$119,204 from the Institute for Museum Services for general operating support and an animal identification program and \$13,711 from other agencies.

Admissions revenue suffered with declines in attendance at the Bronx Zoo and the New York Aquarium; while attendance at the new Central Park Zoo was in line with budget expectations. Total attendance at Society-operated facilities exceeded 3.8 million.

	1989		1988	
	Attendance	Admission fees	Attendance	Admission fees
Bronx Zoo	1,960,231	\$ 2,783,541	2,332,483	\$ 3,189,200
New York Aquarium	710,221	1,663,877	775,227	1,871,213
Central Park Zoo (11 months)	1,178,990	863,600	-	-
	3,849,442	\$5,321,018	3,107,710	\$ 5,063,413

The Bronx Zoo's free admission policy for Tuesdays, Wednesdays, and Thursdays applied to 56 percent of its visitors.

Revenues from *Guest Services* totaled \$10,982,314. Receipts at the Bronx Zoo and the New York Aquarium declined by \$1.5 million (from \$11.8 million to \$10.3 million) due to the drop in attendance of more than 400,000. The number of food and merchandise items available to visitors was expanded and a multi-year facilities improvement program was initiated at the Zoo and Aquarium.

	Bronx Zoo	New York Aquarium	Central Park Zoo (11 months)	Total
Food sales	\$ 3,910,637	\$ 658,228	\$ 375,425	\$ 4,944,290
Merchandise sales	1,384,818	465,122	298,946	2,149,186
Parking	920,063	362,077	-	1,282,140
Exhibit admissions	2,189,665	-	-	2,189,665
Group sales	417,033	-	-	417,033
	\$8,822,216	\$1,485,727	\$674,371	\$10,982,314

Income from *membership dues* increased by 6 percent. *Animal Kingdom* magazine revenues declined 12 percent due to the withdrawal of the San Francisco Zoological Society as a participant. *Education Department* revenues increased nearly 40 percent to \$386,861 as the number of course offerings were expanded at all locations.

General Operating Expenditures

Operating costs totaled \$44,494,181 for the year, with 56 percent (\$24,868,645) being applied to staff. Increased seasonal wages severely reduced margins in Guest Services operations.

Successful fund-raising efforts enabled Wildlife Conservation International to expand its grant program by \$496,102. Expenditures for maintaining the Society's various physical plants increased nearly \$250,000 to \$1,269,142. Animal food and forage costs increased 26 percent due to the increase in collections at the Central Park Zoo and also due to sharply rising prices for grain-based feed products. A new television commercial for the Bronx Zoo and an expanded print campaign for the Aquarium increased advertising costs by \$243,186.

Capital Improvements And Collection Accessions

Expenditures in capital improvements and accessions were \$12,388,907, including \$5,369,018 at the Bronx Zoo, \$3,640,830 at the New York Aquarium, and \$3,379,059 at the Central Park Zoo.

Contributed support for capital improvements was \$8,213,966. Investment activity related to these funds, pending disbursement, provided an additional \$2,148,058, and collection deaccessions provided \$264,766. In accordance with Society plans, \$1,762,117 was withdrawn from funds functioning as endowment to complete necessary capital funding.

At the Bronx Zoo, \$3.6 million was expanded for the renovation of the Elephant House as the Keith W. Johnson Zoo Center. Other capital projects were the John Pierrepont Wildfowl Marsh, opened on May 7, 1989, and two facilities still under construction: the Cogeneration and District Heating System and the African Plaza.

At the Aquarium, \$3.4 million was spent to complete the George D. Ruggieri Discovery Cove. Planning and design work continued on the Sea Cliffs project.

Private funds were complemented by \$8,228,000 provided by the Department of Cultural Affairs of the City of New York for capital improvements at the Bronx Zoo and the New York Aquarium.

The Society's final share of the Central Park Zoo project amounted to \$3,379,059. Work continued on the Flushing Meadows and the Prospect Park zoos.

Endowment Funds

At June 30, 1989 endowment funds totaled \$90.7 million, of which 58 percent was invested in equities. These funds were designated as follows by donors or the Society's board of trustees:

	Market value (in millions)
General	\$ 50.5
Wildlife Conservation International	22.6
Bronx Zoo	13.8
New York Aquarium	2.6
Central Park Zoo	.6
Collection Accessions	.6
	\$ 90.7

Compared to last year the above represents a \$14.7 million increase, including \$4.9 million in additions and a \$9.8 million increase in market value. Equity account indexes continue to rank the Society's portfolio performance in the top decile of similar tax-exempt funds. Income from endowment funds provided \$4.3 million in support; of which two funds established at the direction of the late Lila Acheson Wallace provided nearly \$1.5 million.

David T. Schiff
Treasurer

Operating Revenue and Expenditures

Year Ended June 30, 1989

Operating Support and Revenue

Contributions and fund raising events	\$ 4,969,883
Government support	13,777,111
Admission fees	5,321,018
Guest services revenues	10,982,314
Membership dues	1,938,066
Endowment and other investment income	4,383,434
Publications and related revenue	899,505
Education program revenue	386,861
Miscellaneous revenue	301,790
Total operating support and revenue	42,959,982

Expenditures

Program services	
Bronx Zoo	24,612,079
New York Aquarium	5,123,402
Central Park Zoo	3,866,553
Wildlife Conservation International	3,234,949
Survival Center	331,744
Publications	1,080,502
Membership activities	865,497
Total program services	39,117,726
Supporting services	
Management and general	3,244,824
Fund raising	2,131,631
Total supporting services	5,376,455
Total expenditures	44,494,181
Deficiency of operating support and revenue over expenditures	\$ (1,534,199)

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Recommended Form of Bequest

The Trustees of the Society recommend that for estate planning purposes, members and friends consider the following language or use in their wills:

"To the New York Zoological Society, a not-for-profit, tax-exempt membership organization incorporated in the State of New York in 1895, having as its principal address the New York Zoological Park, Bronx, New York 10460, I hereby give and bequeath for the Society's general purposes."

In order to help the Society avoid future administration costs, it is suggested that the following paragraph be added to any restrictions that are imposed on a bequest:

"If at some future time in the judgment of the Trustees of the New York Zoological Society, it is no longer practical to use the income or principal of this bequest for the purposes intended, the Trustees have the right to use the income or principal for whatever purposes they deem necessary and most closely in accord with the intent described herein."

If you wish to discuss the language of your bequest with a member of the Society's staff, please be in touch with the President's office (212) 220-5115.

Howard Phipps, Jr., President

